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# A SURVEY OF TEACHER OPINIONS ON ENVIRONMENTAL EDUCATION CONTENT FOR INDUSTRIAL ARTS EDUCATION IN ALBERTA

by

© George Joseph Hache'

A THESIS

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled, "A SURVEY OF TEACHER OPINIONS ON ENVIRONMENTAL EDUCATION CONTENT FOR INDUSTRIAL ARTS EDUCATION IN ALBERTA," submitted by GEORGE JOSEPH HACHE in partial fulfilment of the requirements for the degree of Master of Education.

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ABSTRACT

This study was designed to describe the opinions that teachers of industrial arts education had toward the infusion of environmental education content into programs of multiple-activity industrial arts education.

A literature search reviewed the manner in which environmental education has developed and how it is perceived in regard to the industrial arts education segment of the school curriculum. The literature review also enabled the researcher to find a list of Environmental Management Education Concepts that served as a base for the data gathering instrument.

A sample of twenty teachers, taken from randomly selected schools, were interviewed for opinions. These opinions were presented in both tabular and transcribed form.

Using a five point Likert type scale to gather responses on the acceptability of the concepts, the researcher found that 87% of all the responses given by the teachers indicated that the list of concepts as acceptable. A second five point Likert type scale was used to measure the degree of usage of the concepts were currently receiving in the programs of industrial arts. The researcher found that 12% of all the responses indicated the concepts were sometimes mentioned, 35% of the responses indicated the concepts were rarely mentioned, and 65% of the responses indicated the concepts were never mentioned in the industrial arts programs. Over fifty percent of the responses on a third

scale indicated that the limited existence of software was perceived as a factor that affected the introduction of the concepts into the industrial arts program.

The results of the non-directive interveiw provided added insight into the concerns teachers had toward the concepts list used in the instrument. Other concerns related to the implementation of environmental education content into multiple activity industrial arts programs were also noted.

The overall finding of the survey was that teachers agreed that the multiple activity concept of industrial arts education has much flexibility in including environmental education content. However, the sample indicated that little environmental education content is currently being developed in I. A. The availability of software appeared to be a factor among others that teachers viewed as inhibiting the introduction of environmental education content.

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# CHAPTER I

# INTRODUCTION

## Orientation to the Study

Alberta has been greatly influenced by the industrial growth of North America as well as by a fundamental factor that has accompanied the growth. A statement by Chapman (1966, p. 37) describes the context in which industrial development has thrived:

> One of the most fundamental societal factors involved in the interaction between man and nature is the technology that man has at his disposal for discovering, producing, processing, and using materials of his environment.

Such statements have provided the basis for the assumptions concerning the need for industrialization and growth. It has been one assumption that by manipulating the natural materials of the environment man can provide himself with the components interpreted as essential for a higher standard of living (Glacken, 1974, pp. 20-21). The recognizable result has been the seeking of industrial development because it was synonymous with growth, increased standards of living, wealth and prestige (Kerr et al., 1960).

Recently, however, societies that have benefited from industrialization have taken a closer look at the holistic description of the trend. In an address to the opening session of the Preparatory Committee for the Human Environment, the former Secretary General of the United Nations summed up what was becoming a rising concern. U Thant stated:

> The realization of a new and disturbing aspect of the spreading and growing of industrial civilization has now arisen: man has suddenly awakened to the dimensions, to the rapidity, and to the mass effect of productive processes on the physical endowment and configuration of this planet and its basic biological balances. To produce at any cost, without due consideration to the effects on the environment, can no longer be the central preoccupation of man (Environment Canada,1972, p. 87).

As the above quote appears to be a paradox to traditional beliefs concerning technology, it has caused concern among groups in North America. The realization described above has led to the formation of advisory groups aimed at gathering and researching methods that could become useful in curtailing the rising ecological imbalances. One such group, Environment Canada, has cited a need that provides a challenge to all educators. In speaking of the environment they have stated: "There is a need to improve environmental education at all levels (1972, p.3)."

To meet this need, one proposal has been to integrate concepts of environmental education into all subject matter (Alberta Department of Education, 1974, p.11).

Industrial arts education in Alberta has been recognized by the Alberta Department of Education as a segment of general education for the junior high school and senior high schools. Industrial arts has found acceptance as follows:

> Industrial Arts, the exploratory phase of a continuum, provides the opportunity for the student to explore, reason, experiment and discover the realities of technological society in which they live. The content of the program deals with industry and its organizations, material processes, products, occupations, and the problems resulting from the impact of technology on society (Government of Alberta, p.2).

If industrial arts is called upon to facilitate having a student become knowledgeable of the impactyof technology, everging concepts related to the role technology has on the human environment can find a place in the general industrial arts curriculum (Olson, 1971).

## Statement of the Problem

Studies have been conducted to determine which environmental education concepts are acceptable to industrial arts programs, but none have been specifically done to determine which environmental concepts Alberta industrial arts teachers judge are most acceptable to a multiple activity industrial arts program.

## Research Questions

The main purpose of this study was to identify and provide a description of the environmental education concepts that could be taught in a multiple activity industrial arts program.

This study considered the following questions:

1. Which environmental education concepts are acceptable to programs of multiple activity industrial arts?
2. Which environmental education concepts are already being taught in the existing programs by multiple activity industrial arts instructors?
3. Is the availabitity of written material the major factor influencing the introduction of environmental education content in industrial arts?

4. What concerns do industrial arts instructors have in relation to the inclusion of environmental education content in their programs?

## Description of the Methodology

The methodology used for identifying concepts was approached in three phases. It involved a literature search, the formation of an instrument based on the literature search, and the tabulation of the teachers opinions gathered with the instrument.

### Phase I

The literature search was made into periodicals, references, journals, and related studies to provide a general perspective for the study. The intent of the search was to uncover a list of environmental concepts that had been determined acceptable to educational settings and in particular industrial arts. The search included current thought on the need to infuse environmental education concepts in industrial arts.

### Phase II

Based on the material uncovered in Phase I, an instrument was developed and used to gather information from selected industrial arts teachers in the Province of Alberta. The intent of this phase was to solicit opinions from the teachers concerning the acceptability of the concepts for their programs.

### Phase III

In the analysis of the returned instruments the major concern

was to determine which concepts were judged most acceptable by teachers, as well as which concepts teachers judged to be already adequately taught in the existing industrial arts programs.

## Delimitations

As the study was concerned with opinions given regarding multiple activity industrial arts programs, the sample was delimited to those teachers who had first hand experience with multiple activity philosophy and content for industrial arts.

The instrument used in the study was based on research findings other researchers have contributed to the field. Those environmental education concepts developed through research findings for use in educational settings were employed in developing the instrument.

## Assumptions

The main assumptions that the researcher made while conducting this study were the following:

1. It was assumed that the industrial arts instructors in the Province of Alberta that have taken undergraduate industrial arts courses in the Department of Industrial Arts and Vocational Education of the University of Alberta were sufficiently knowledgeable of the philosophy and methods of instruction that are commonly referenced

with the multiple activity industrial arts program.

2. It was further assumed that these industrial arts instructors were able to conceptualize the usefulness of an environmental education concept to the programs of industrial arts education and reflect their opinions in this study.

3. It was assumed that information regarding the accuracy of credentials and qualifications obtained on the participating teachers was accurate.

## Operational Definitions

For the purpose of the study the following terms were used to denote their accompanying descriptions:

Environment

The climatic, edaphic and biotic factors that act upon an organism, an ecological community and which ultimately determines its form of survival (Websters, 1965, p.276).

Environmental Education

As educators began perceiving the need for curriculum that identified the many-faceted man and environment interaction, numerous types of educational programs were designed and called environmental education.

For the purpose of this study environmental education will denote those educational programs designed with the aim of fostering in people an environmental ethic necessary for

survival and for human development (Tomlinson, 1974, p. 35).

Multiple activity industrial arts

A laboratory based program where the student can experience a multiplicity of activities that relate to society's technology. A synthesizing educational environment that can reinforce the command of academic disciplines (Ziel, Leblanc and Manuel, 1966).

Environmental Education Concepts

For the purpose of this study, environmental education concepts will denote generalizations that are associated with environmental concerns and can be used in educational settings.

Environmental Ethic

A conventionality believed to be right, good, and harmonious to a quality environment.

Holism

A term used in a study by Bame (1972) to describe the concept of being able to include all knowledge of input and output variables interacting on a segment of knowledge.

## Significance of the Study

It has become apparent that this study was the first attempt in Alberta and Canada to identify the environmental concepts that are relevant to multiple activity industrial arts programs. Preliminary research revealed that although industrial arts education

courses deal with various sorts of information on technology, few afford information as to what environmental concepts could be taught. Further the researcher found through visits to fifteen schools in Alberta with a structured interview that there existed confusion, lack of knowledge and in some cases indifference concerning the feasibility of infusing environmental concepts into industrial arts curriculum. Studies by Bame (1972) and Cauley (1971) in a related area indicated that information related to environmental education content for industrial arts programs was limited. Both studies indicated that there existed a need for further studies to provide information that could be used by industrial arts instructors.

In view of these preliminary findings a study of this nature could serve to identify estimates, relationships, or variables related to the interfacing of environmental education to multiple activity industrial arts education programs that have not yet previously been identified.

# CHAPTER II

# REVIEW OF THE LITERATURE

## Introduction

The preceding chapter has provided a brief description of the purpose and direction for this study. As the study intends to identify environmental education concepts that are acceptable to industrial arts education, this chapter will describe the setting in which interest in environmental education has risen during recent years. This chapter provides an overview of the need for environmental education, the current status of environmental education, the research conducted to identify environmental education concepts, and the thoughts concerning the direction for environmental education in industrial arts.

## The Emergence of Environmental Education

Fundamental to the tradition of education has been the responsibility taken on by an individual or a community of persons in directing and instructing other members in the methods that are necessary for survival. History has repeatedly shown the existence of this tradition. It further shows that the simplistic view of education has grown in dimension as the communities have adopted more complex technologies (Arden L. Pratt, 1972). Jerome Bruner (1971) described the definition of education as dynamic, demonstrating evidence of change in its meaning and aspirations with the passage of time.

The use of words such as grow, dynamic, and change led to the belief that the twentieth century's definition and aspirations for education are much more complex than those reflected in earlier practices. Jules Henry (1972) acknowledges the existence of these differences but maintains that the fundamental aspect remains in all goals and definitions. The "adaptation to the environment" is inherent in all educational schemes described in Henry's cross cultural model of the definition of education (p.76).

In a speech delivered in Edmonton on November 27, 1974, Ralph Nader advocated that "We are the environment, the environment is us". Further, his statement that the interaction between man and his environment must receive greater emphasis in schools remains consistent with the fundamental traditions of education.

According to Jacob Bronouski (1974) the environment western man has had to adjust to has been "culture driven" by a component called technology. Roelofs, Crowley, and Hardesty (1974) indicate that the development and use of technology has been a modifier of the environment and throughout the ages a guiding force in human evolution. The state of development of a technology within the last century has become the apparent indicator of how close humanity has approached its utopia.

Historians Katz (1956) and Johnson (1968) indicate that the Canadian tradition in education has not been an exception. The evolution of education in Canada has repeatedly demonstrated that

educational systems have reflected the needs a growing nation interpreted as necessary for survival. It has been the adjustment to an environment that allowed the inclusion of the technology that became a factor in determining the technological survival of the Canadian nation.

Recently the Alberta Department of Education distributed The Goals of Education, Grades 1-12: An Unofficial Interim Edition (1974). The paper concerned itself with the goals of basic education and was designed to promote discussion with regard to "what is to be done by education and to establish how education is to be accomplished" (p.1-2). In a section of the report describing the environment in which education takes place the report states:

> The pervasiveness and rapidity of change in things or technological change, have placed stresses upon the relationship of people to each other and of people to things (p.5).

The report then states that one of the consequences of the indicated change was:

> Pollution, unchecked exploitation of nonrenewable resources and other damages to the natural environment have brought about a sensitivity to the relationship of people to things (p.6).

The report further related that:

> Insatiable demands upon the natural environment threatens to consume, destroy, or poison the limited resources upon which life itself depends. If used with understanding and restraint, resources of the environment can, however, continue to serve as well as to provide opportunities for intellectual and emotional appreciation (p.6-7).

To counterbalance the forces affecting education and society, the forces supporting stability were described in the report and summated with the following statement:

> In short, a person's interaction with others and things will be a blend of the old and the new, the changing and the stable elements of social and physical environment. Therefore the goals of education should identify the skills, knowledges and personal development which evolves persons to cope successfully with those interactions (p.7).

The preceding information is evidence that the goals of education used in Alberta have not deviated from the fundamental tradition of education. However, current descriptions have further stressed that aspects of ecology, quality of life, and conservation are factors that merit added consideration in the description of an environment.

Environmental Education

The concern for the environment and the teaching of concepts of environment are not unique to the province of Alberta. April 22, 1970, Earth Day, was a day of national demonstration by United States' citizens who were concerned with the quality of the environment. The seemingly short time in which environment and ecological concerns grasped the interest of the populace of the United States has been referred to as the "Environmental Revolution".

The response to the environmental revolution was apparent in many sectors of the North American social fabric.

Sentiment led to public pressure groups, which in turn has led to the emergence of legislation to curb the destruction of the natural environment, and to the introduction of educational schemes designed to enhance students' familiarization with aspects of their environment. Since the late sixties numerous universities have begun to offer courses and programs in environmental studies (Pratt, 1971, pp.75-79).

A greater quantity of literature describing not only environmental problems but suggesting solutions has become available. The Educational Research Information Center (ERIC) system which carried no classification called "environmental education" in 1969, had approximately 126 articles under that classification in its 1974 Index. Professional organizations such as the international Club of Rome, the National Environmental Education Association in the United States, Save Tomorrow Oppose Pollution (STOP) in Canada, and The Ecology Action Group in California are among the ones that are established with the aim of disseminating information concerning the environment and researching solutions to environmental problems.

In reviewing literature made available by environmental organizations and from periodicals, it became evident that there exists a common concern. The concern was stated in The Limits of Growth (Meadows et al., 1972) as:

> An overall strategy must be evolved to attack all major problems, including in particular those of man's relationship with his environment (p.195).

Recognizing the problems emanating from environmental degradation, the delegates to the Man and Resources Conference (Tomlinson, 1974) have stated the following as a vital issue:

> The need for comprehensive environmental education identified by groups across the country, stem from a basic concern. There is a realization that the management of the environmental problems that face us will require ongoing and broadly based participation, for which education is a necessary prerequisite (p. 35).

A Brief History of Programs in Environmental Education

Specific courses and programs in general education that have included concepts of ecology, environment, nature study have a relatively short history. Literature reveals that as early as 1893 a review committee for secondary education studies, The Committee of Ten, and later Cornell Baily of Cornell University made recommendations to include more information concerning nature in schools. In the following years environmental education, ecology, and nature study courses were championed at meetings dealing with life science. The early attempts were made in biology courses where particular emphasis was placed on the relationships between man and nature. Until the late sixties biology courses appeared to be the only educational courses to deal with the topic (Terry, 1971, p.xv).

Leon Balzar (1971) gives a classification and description of the early attempts in environmental education as follows:

1. Nature Study - Major purpose is to get individuals to satisfy their curosity in regard to the awe and beauty of the environment. The nature of the course

is to involve students in field trips to admire, experience, explore and observe the natural environment. The central emphasis is on the aesthetic quality of the environment.

2. Conservation Education - Primarily designed to study conservation, forestry, watershed, wildlife, minerals, park and reserve management, and space utilization.

3. Outdoor Lab and Outdoor Education - Executed under ideal conditions out of doors, these courses deal with programming, planning and management of outdoor areas and activities. The content is similar to conservation education and lends itself well to the objectives in the curricular areas of language arts, music, social studies, sciences, industrial arts, and physical education.

4. Outdoor Education - Outdoor Education has activities similar to those conducted by groups such as Boy Scouts. The attempt of this type of activity is to provide time and place for groups to work together in learning to use their environment for recreational purposes (p. 220).

In describing the current status of environmental education Balzar (1971) stated:

> Obviously much of what is being attempted in Environmental Education (E E) is not new. At the same time it is apparent that past efforts to generate favorable attitudes and behaviors toward the environment have not been particularly successful (p.225).

To affect greater awareness of man's interaction Balzar offered the following recommendation:

> When the potential contributions of all these areas toward the ultimate behavioral goals of environmental education are worked out, we will be moving toward a total curriculum of environmental education in the K-12 span. In the process we may even involve some major themes around which our objectives can be more simply structured (p.225).

It became apparent through searching the literature that the multi-disciplinary approach of infusing environmental education concepts into the existing curricular practices was a favored approach.

Environmental Education in Alberta

Aspects of environmental education, ecology, and conservation have been formally introduced into Alberta's schools in science-related courses such as Biology 10, 20, and 30, as well as in Science 11. It is believed that other school courses may be introducing environmental concepts but it is not known to what extent. The Department of Education in Alberta indicates that the option to introduce concepts in other courses exists, but it is not often exercised for reasons such as; lack of funds, insufficient background of teachers, and limited access to suitable and relevant materials (Department of Education: Alberta, 1974, p.9).

In seeking further information, the researcher found that in recent years informal programs of outdoor education have been practiced in Alberta schools. In the outdoor courses fundamental environmental concepts are introduced to the students on an "as the need arises" basis when deemed necessary by the instructor. Lessons and concepts are disseminated to students who are involved in various sorts of activities such as outdoor recreation, camping trips, hikes, and picnics (Passmore, 1972).

The individuals interviewed in connection with the outdoor education courses stated that to their knowledge there existed very little organized material that could be used to identify the environmental concepts covered in their programs (Inscho, 1974).

The Department of Education in Alberta has become concerned with the topic of environmental education and has formulated a position paper in regard to its scope of implementation for Alberta secondary schools. The terms used in describing environmental education in the Directions for Environmental Education (1974) were as follows:

> ...environmental education is:
>
> - an approach to teaching about man's relationship to his environment--how he affects and is affected by the world around him.
>
> - an integrated process dealing with man's natural and man-made surroundings.
>
> - experience-based learning using the total human, natural, and physical resources of the school and surrounding community as an educational laboratory.
>
> - an interdisciplinary approach which relates all subject areas to a whole-earth "oneness of purpose".
>
> - life-centered and oriented toward community development.
>
> - a rational process to improve the quality of life.
>
> - geared toward developing behavior patterns that will endure throughout life.
>
> - oriented toward survival in an urban, technologically centered society.

The consensus is that environmental education is:

> - More than conservation, outdoor resource management, or nature study (although these areas may be included

in an environmental education program).

- Not a cumbersome new program requiring vast outlays of capital and operating funds.

- Not a self-contained course to be added to the already overcrowded curriculum.

- Not merely getting out of the classroom (p.4-5).

The position taken by the Alberta Department of Education (1974) concerning the place environmental education is to have in the secondary school curriculum is as follows:

> ...environmental education should be developed as an interdisciplinary activity, consistent with the goals of basic education, and utilizing the resources of governmental, social and private agencies, groups and individuals (p.11).

The Department of Education (1974) further states that it:

> ...recognizes the need for short term upgrading of environmental education activities in the current curricular package as being a primary curricular priority, especially in the disciplinary areas of social sciences, physical sciences and industrial education (p.13).

## Implications for Industrial Arts Education

Delmar Olson (1971) described the relevance industrial arts education has to environmental education principles with the following statement:

> As has been postulated, technology is man creating his own environment. This is the environment of the man made. Whenever man settles he creates his own environment, and in our country this is the technology. The technology of the future is the new technology. It is new in that it co-exists with nature and is subservient to it.
>
> A functional relationship of technology, environment, and industrial arts education puts the latter

> in the role of the interpreter of the other two. In this capacity, industrial arts education has both challenge and responsibility to such a magnitude as to require a substantial re-design of its structure as well as its purpose (p. 237-244).

Recently the Alberta Department of Education organized a provincial committee to revise the industrial arts program of instruction. The revised goals included an indication that environmental concerns were one of the seven major headings about which instruction is to be developed. On October 21 & 22, 1974 the General Technology and Cluster Ad Hoc Curriculum Committee met and reviewed a list of eight concepts pertinent to industrial education. The minutes of the meeting indicate that it was agreed that the concepts would be common to all areas of study in industrial arts education. Included as a concept in the list was the following:

2. Environmental Implications

- Time element (past, present, future)
- Rates of consumption
- Conservation
- Alternatives
- Pollution (land, air, water, noise) (1974, p.4)

## Related Research

The works reviewed in this section of the study are those that have identified environmental education concepts for general education and industrial arts education.

A search of the literature has led to the identification of concepts, ideas, strategies, and materials that are related to the environment and can be of use in teaching industrial arts.

All such information uncovered through the literature search was looked at in terms of writing concepts and sub-concepts. As the search progressed it became apparent that many of the concepts developed were identical to, or could be classified as sub-concepts of, those concepts developed by the researchers who had employed educational research techniques.

This section will include five studies found that have developed concepts through research practices.

Roth Study

A study by Robert Earl Roth (1970) was conducted to develop a taxonomy of conceptual objectives for use in planning programs of instruction for K-16 and that included aspects of environmental education. His research included both a literature search and an opinionaire given to experts in various occupations in the field. Roth divided his study into three major sections.

The first section of the research developed a list of environmental concepts. A University of Wisconsin panel of experts representing 40 professional fields were asked to react to the question, "What should students know about environmental management?" (p.16). From the results of the first opinionaire a list of concepts was formulated with the use of a Blanchet scale technique that had been modified by Roth. The modified list containing 128 concepts was then sent to 699 individuals who represented 40 disciplines and the 12 ecological areas of the United States. The results were that 50.7% interviewees responded to allow the rank ordering of 111 accepted concepts. The returns

were tabulated using a reciprocal averages program. The criteria for the acceptance of a concept was the ninety percent frequency of acceptance of an environmental education concept.

The significance of this study is that it is the first study designed specifically to find environmental education concepts useable for courses of instruction in environment education. Horn (1972) points out that prior to the Roth study, environment concept lists were either agriculturally or recreationally oriented. The study by Horn (1972) asks a question concerning the validity of the list of 111 concepts developed by Roth. The Horn study was designed to validate the concepts list by polling teachers of elementary and/or middle school students. The question asked was whether there exists a "significant correlation in the taxonomy ranking of selected environmental management concepts reported by Roth and the ranking by teachers of students at the K-8 level" (p. 2). Horn's sample was a group of thirty-one teachers who indicated their desire to participate in the study conducted at the University of South Dakota. A significant correlation between the ranking of the Roth panel and the teachers' ranking indicated that the concepts were valid. The data showed, however, that teachers in the Horn study viewed the priority of importance of the objectives differently then the college educators of the Roth study.

Cauley Study

Concepts identified by Roth were used in a study by Cauley (1972) to establish a relationship between environmental education

and industrial arts education. A jury of seven qualified persons specializing in seven areas of study in the industrial arts teacher education program where the study was conducted were selected for the first phase of the study. They were asked which concepts of the list of 111 developtd by Roth would make the greatest contribution to industrial arts education. The fifty-three concepts from the first phase were reformulated into an opinionaire. The slate of fifty-three concepts was given to a panel of 313 industrial arts teacher educators who categorized them as to their applicability to industrial arts education. Of the fifty-three concepts, fifty-two were found acceptable at the 66% level of acceptance. The Cauley study further classified the concepts into the industrial arts instructional areas. The frequency and percentage of positive responses on the accepted concepts was also given. The instructional areas classification is described with Table 1.

Because the philosophy of industrial arts in the Province of Alberta is to explore many industrial processes in a multiple activity setting, it differs from the fundamental structure in which the Cauley study was conducted. The Cauley study is in a setting which appears to be an industrial arts program designed to familiarize the student with industrial processes in the seven fields depicted in Table 1. As the Alberta program is predicated on the premise that no profession or occupation operates in a vacuum, it seeks to permeate all facets of modern teachological society (Cochrane, 1970, p. 74).

TABLE 1

THE CAULEY CLASSIFICATION OF CONCEPTS

| Instructional area in industrial arts | Number of Concepts | Percentage of Concepts |
|---|---|---|
| Drafting | 9 | 17.3% |
| Metals | 2 | 3.8% |
| Electronics | 0 | 0 |
| Graphic Arts | 2 | 3.8% |
| Power | 12 | 23.1% |
| Woods | 25 | 48.1% |
| Plastic Crafts | 2 | 3.8% |

A question asked by the researcher is whether some of the environmental education concepts that have been eliminated by Cauley could have been included in a program that purports to afford experiences in a greater variety of industrial processes, as is the nature of the program of industrial arts in Alberta.

Cauley concludes his study by stating that there exists a definite relationship between industrial arts and environmental education and that concepts used in his study should be included in industrial arts education programs. In his conclusions however, Cauley states that teachers of industrial arts at the secondary school level may provide a differing opinion than that given by industrial arts teacher educators on a list of useable concepts.

Project I.C.E.

Funded by the United States Government, Project I.C.E. (1974) (Instruction-Curriculum-Environment) was undertaken to design a supplementary guide of environmental education concepts that could be useable in grades K-12. The two-year study involved 200 teachers at 10 meetings at the University of Wisconsin. The final product was a "dynamic dozen" of environmental education concepts around which teaching units were developed for various curriculums. Included was industrial arts. The "dynamic dozen" are as follows:

1. Energy from the sun is converted by plants into a form that all living things can use for life processes.

2. All living systems interact among themselves and their environment, forming an ecosystem.

3. Environmental factors are limiting on the number of organisms living within their influence, thus each environment has a carrying capacity.

4. An adequate supply of clean water is essential to life.

5. An adequate supply of clean air is essential to life.

6. Natural resources are unequally distributed over the earth or time, and the effect is on the quality of life.

7. Factors such as facilitating transportation economic conditions, population growth and increased leisure time have a greater influence on land use and population centers.

8. Cultural, economic, social, and political factors determine the status of man's values and attitudes toward the environment.

9. Man has the ability to manage, manipulate, and change his environment.

10. Short term economic gains may produce long term environmental losses.

11. Individual acts, duplicated or compounded produce significant environmental alterations over time.

12. Each person must exercise stewardship of the earth for the benefit of mankind (pp. 27-28).

From this list of basic concepts a curriculum for industrial arts educators has been developed. The format suggested activities that would allow the concepts to be taught in schools.

The Bame Study

The purpose of the Bame study (1972) was to examine the interface that exists between the natural environment and industrial

arts. The study searched for concepts that were descriptive and reflective of the different interfaces.

Part one of the three-part study dealt with the identification of concepts related to environment and technology through a literature search. The concepts were arranged into seven related groups. The second part of the study was the submission of the list of concepts to a jury of experts representing various disciplines at North Carolina State University. The jury was asked to judge the concepts for acceptability, acceptable with reservation, or reject. From the results of the second phase the third part led to the development of implications for industrial arts and a second opinionaire. The second instrument was given to industrial arts teacher educators to determine their judgement of the list of concepts with the following three questions:

1. To what degree is the information now emphasized?
2. To what degree should the information be emphasized?
3. Do you agree or disagree with the possible implications?

## Summary

This chapter has sought to establish a need for environmental education concepts reflected by opinions of educators, government bodies, professional organizations, and the public.

The literature reviewed has indicated that environmental education has a functional relationship to industrial arts within

the general education setting. It is an aspect of life education that is viewed as being neglected for varied reasons, one of which is the lack of identifiable concepts, and information upon which research in the field can be conducted.

From research findings it has become apparent to the investigator that industrial arts instructors have yet to be polled for their opinions concerning the usefulness of environmental concepts in their industrial arts programs. Further, the nature of the philosophy of industrial arts in the province of Alberta differs from that philosophy of industrial arts programs in which one similar study has been conducted. Therefore the question of what other concepts may be identified as acceptable for industrial arts in Alberta exists.

# CHAPTER III

# METHODOLOGY

## Introduction

The preceding chapter gave a description of environmental education, the research conducted in the area of environmental education and an indication that there is a perceived need to include environmental education content in all aspects of our schools' curriculum. Further, it was reported in Chapter II that the perceived need has been found among Alberta educators specifically dealing with curruculum designs for the Alberta industrial arts programs.

The introduction of new material into educational settings is dependent upon factors that may inhibit their adoption. Two of the variable factors in schools that act in this fashion are the teachers' perceived need for the change and the amount of information from which decisions concerning adequate planning can commence (Owens, 1970).

This study deals with these two factors in describing those environmental education concepts which a group of Alberta teachers feel are most applicable. Chapter three outlines the procedure that was used to gather information related to how a list of environmental education concepts was perceived. It describes the population from which a sample of teachers was drawn, the development of the instrument, the administration of the study, and the method used to analyse the data.

## The Population and the Sample

Alberta has a widely scattered distribution of approximately three hundred and ten schools that have functioning industrial arts programs. The vast majority of the population of approximately four hundred and forty-five teachers of industrial arts subjects in the province have training backgrounds that can be classified in different ways. One classification adopted for the purpose of this study is as follows:

1. There are industrial arts teachers within the total population of schools that have received training at the University of Calgary industrial arts teacher education program and have not taken courses in the Department of Industrial Arts and Vocational Education of the University of Alberta.
2. There are industrial arts teachers who have received training in institutions outside of Alberta and have not taken any industrial arts courses at the University of Alberta.
3. There are industrial arts teachers that have received industrial arts courses at the Department of Industrial Arts and Vocational Education at the University of Alberta.

Limited information exists concerning the classification of these groups. The nature of their distribution in the province

is not known. It was from the population of schools that have industrial arts teachers that a sample of schools was selected for the study.

The procedure used for the selection of the sample from the population already described was designed with the intent of maximizing the number of participants in an accessible geographic location. A secondary consideration was the availability of time and resources to conduct interviews. These two considerations and the assumption that any sample drawn from the total population of schools or teachers would not differ appreciably from any other sample led the researcher to develop the procedure around the selection of schools rather than teachers. The criteria used for the selection process was as follows:

1. Schools that had industrial arts programs and were located within one hundred and fifty kilometers of the centers of Edmonton, Red Deer and Calgary would be randomly selected with the use of a table of random numbers. The area included the two major population centers, the majority of the schools that have industrial arts programs, and the majority of industrial arts teachers.
2. Each instructor teaching in a selected school that had taken all or part of his industrial arts courses at the University of Alberta would be

considered a teacher qualified to participate in the study. As the research question dealt with the opinions of acceptability of concepts to programs of multiple activity industrial arts, those teachers that had taken courses at the University of Alberta were believed to be sufficiently knowledgeable of the multiple activity industrial arts programs.

The Selection of the Sample

The latest available list of schools that had industrial arts programs in the Province of Alberta and the latest available list of Approved Schools in Alberta were obtained from the provincial consultant for industrial arts education, at the Department of Education in Edmonton. The lists of the schools that had industrial arts programs also had the names of the teachers that were teaching the course.

Each school on the list of schools that had industrial arts programs was assigned a number that commenced with one and ended with three hundred and ten.

Using a table of random numbers (Englehart, 1973, p.521) and the procedure described for its use, a battery of numbers was selected.

The selected numbers were referenced to the list of numbered schools. Those schools located beyond the one hundred and fifty kilometer limit imposed by the study were omitted.

The training background of each industrial arts teacher on the shorter list of selected schools was referenced with the cooperation of the Division of Student Records of the University of Alberta's Faculty of Education. Those teachers that had taken courses in the Department of Industrial Arts were believed to have sufficient knowledge of the philosophy and methods of instruction identified with multiple activity industrial arts education and were retained.

The method allowed the selection of twenty three industrial arts teacher's names that were believed qualified to participate in the survey.

## The Instrument

### The Development of the Instrument

A close analysis of the environmental concepts derived from the literature search and from the studies reviewed in Chapter II indicated that there were many similar and identical concepts among the several studies. It became apparent that the Roth (1970) study had developed the most representative list of environmental management education concepts. Horn (1971) had further validated the Roth study.

It was therefore decided by the researcher to request permission from Dr. Roth to use the instrument he had developed (Appendix A).

A prompt response was received from Dr. Roth granting permission to use the concepts list he had developed (Appendix A).

In an effort to validate the instrument the researcher submitted the instrument to a panel of seven doctoral and masters students within the Faculty of Education. The following information was sought from the panel:

1. The amount of time required to complete the instrument.
2. The perceptions of the panel toward the appropriateness of the Roth instrument of concepts to Alberta.
3. Recommendations concerning the administration of the test to teachers.

It was believed that a panel of graduate research students from the Faculty of Education who had previously been or were currently involved in educational research would be able to give recommendations as to how the concepts list and instrument could be most effectively used to meet the objectives of the study.

The subsequent modification of the Roth instrument incorporated the following recommendations of the panel:

1. The establishment of personal contact with teachers to explain the study, motivate teachers to respond to a large instrument, and clarify any concepts that appeared confusing to the teachers.

2. The addition of two scales of similar design to the one already accompanying the Roth instrument. The second scale was to measure the current status of environmental education in the schools. A third scale was designed to find out if the availability of software such as written materials, student activity packages or resource units was a factor that determined the concepts use in industrial arts.
3. The flexibility to record any additional comments that the persons in the sample would make concerning the status of environmental education content for industrial arts.

The Scales

The original instrument developed by Roth (1970) that included a five-item response Likert-type scale was used as the base for the modified instrument for this study. Two additional Likert-type scales were designed to answer the other questions asked by the study. The added scales were designed to be consistent with with original included in the Roth study and followed the guidelines described by Best (1970, pp. 174-176).

The second scale intended to get a response to a question regarding the degree each teacher currently used an environmental educational concept in their program.

The third scale dealt with finding whether the availability of software was the factor that influenced the degree to which the

teachers currently included environmental education content in their programs of industrial arts (Appendix B).

## Administration of the Study

A list of Locally Appointed Superintendents of Schools in Alberta was acquired from the Division of Field Experiences of the Faculty of Education. The superintendents of each of the selected schools were sent a letter that requested permission to interview the teacher or teachers in his school system that had been drawn in the sampling procedure. Each letter to the superintendent's office described the intent of the study. A response form and a stamped self-addressed envelope was also included (Appendix C).

The formal procedure of obtaining permission to conduct the study in the Edmonton Public and Edmonton Separate Schools was administered through the Division of Field Experiences of The Faculty of Education (Appendix D).

The list of Approved Schools in Alberta provided the names and addresses of the principals of schools that had been selected. The principal of each of the selected schools was contacted by telephone after the response card that indicated permission was granted was received from the office of the superintendent. Each principal was given a brief description of the study and asked for permission to enter his school to interview the teacher or teachers that had been selected. In some cases the principal had

consulted the industrial arts personnel involved and was prepared to designate a suitable interview time. The remainder of the principals preferred that the researcher contact the teacher directly to arrange an interview time.

Once a suitable interview time had been established, each teacher was mailed the following information:

1. A list of Environmental Management Education Concepts.
2. A brief description of the study.
3. A verification of the interview time (Appendix G).

As much of the mailing and receiving of letters was complicated by a postal strike, the mailing procedure was modified to ensure that each teacher received the information necessary to participate in the study. In some cases telephone calls were required to the offices of superintendents and in other cases special trips to deliver information to the teachers were required.

Although the physical settings for the interviews varied widely, each setting was comfortably appointed and void of interfreences that would have detracted from the interaction with the teachers. The duration of the interactions varied from approximately one half to three hours and were dependent on the willingness of the teacher involved to give information. Each interview with a teacher was divided into the three sections; an orientation, an interview, and the data gathering.

The Orientation

Each interview began with an orientation that was designed to provide pertinent information and a common frame of reference to the teacher to enable him to complete the data-gathering phase of the survey. To meet these objectives as well as create a positive motivation toward the study, the orientation consisted of the following component parts.:

1. A brief historical description of the development of environmental education.
2. A short description of the current thoughts concerning the environmental education needs in schools.
3. A clarification of the intent of the study where needed.
4. An explanation of the mechanics the study was to use to obtain opinions on the list of environmental management education concepts.

The Interview

Following the orientation the researcher employed the non-directive interview approach of obtaining opinions and concerns.

A search into the literature revealed that the non-directive interview approach was described as the most flexible technique available to conduct a survey of this nature.

Hoke (1970, p.26) has described exploratory type interviewing as a means of discovering relationships among variables, theories,

and for setting up hypotheses for further research. It provides estimates of variables for which no objective tests were yet designed.

Good (1972, p.238) states that interviews are dynamic processes of communication and motivation. The non-directive interview described by Good was adapted to the study for the "freedom it allows the respondents to talk about the problems under study" (p.244).

The technique of non-directive interviewing was also believed to accommodate the concerns and suggestions of the review panel described in this chapter.

As is the pattern for non-directive interviews, the questions asked during the interview time followed no specific guide. The interviewer picked clues afforded by the interviewee in seeking opinions to the topic in review.

The Data Collection

The subjects involved in the study were asked to rate each of the concepts on the list that had been mailed to him. A copy of the three separate questions and the choices for answers was given to each teacher. During this phase of the interaction the researcher recorded the responses on optical scoring sheets. Each teacher was allowed to progress at his own rate. Questions and comments concerning the concepts were answered and recorded by the researcher.

As the total time necessary to proceed through the list of concepts exceeded the time that some of the participants could afford the option to leave the list and questions with the teacher was made available. The concepts that this group of teachers found confusing were left unmarked and later clarified by the researcher.

## Method of Analysis

The data obtained from each person in the sample was placed by the researcher on three separate optical scoring sheets. Each sheet was marked with a number that identified the source of the data and the scale the data pertained to.

From the optical scoring sheets, the University of Alberta Computing System Services punched coded IBM data cards. The cards were decoded, using the XDER DECODE5 program. The decoded cards were run into a program designed to give a straight tabulation of frequencies of responses. The program used for this purpose was NONPO10, Cross Classification with Subdivisions.

The process was conducted once for each question that was asked in the instrument.

The weighted means of the responses on each of the one hundred and eleven variables obtained from the first research question was computed using the following reciprocal averages formula taken from the instrument used in the Roth study.

$$\frac{5n_i + 4n_i + 3n_i + 2n_i - 5n_i}{En_i} = \text{Weighted Means}^{1}$$

The means of the responses for the second and third research questions were computed for each of the one hundred and eleven variables with an unweighted means computation formula.

$$\frac{5n_i + 4n_i + 3n_i + 2n_i + 1n_i}{En_i} = \text{Means}$$

Three means of the responses were therefore computed for each variable with the use of EXDER Program DESTO7.

The additional comments made to the researcher during the course of the interview were initially noted at the time of the interview. These comments were transcribed and are presented in the description of the data.

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1 Formula used by Roth to compute the combined weighted mean score. $n_i$ represents the response given by each individual sample member. E represents the summation of all the n that responded to the scale.

# CHAPTER IV

# PRESENTATION OF THE FINDINGS

## Introduction

The preceding chapter gave a description of the methodology that was developed to gather opinions expressed by a sample of industrial arts teachers on the topic of environmental education content for industrial arts education. Chapter III also discussed the manner in which the survey was conducted and the method employed to analyse the results.

In this chapter, the three instrument questions are restated. A description of the responses for each of the scale questions is presented in combined tables to facilitate interpretation. The additional comments made by the sample that relate to the topic being studied are also presented in this chapter.

## Respondents to the Survey

From the list of twenty-three teachers originally selected through the selection process described in Chapter 111, twenty teachers were interviewed and nineteen teachers responded to the survey questions. Table 2 gives an indication of the success the researcher had in scheduling interviews and collecting data.

## Results of the Instrument

### Tabulation of Scores

Table 3 gives the results of the scoring on each of the three

TABLE 2

Nature of Data Returns

| Factors that determined the success in gathering data | Interviews | Instruments |
|---|---|---|
| Teachers requesting not to be involved in the survey | 1 | 2 |
| Teachers no longer teaching I.A. | 1 | 1 |
| Schools requesting not to participate | 1 | 1 |
| Completed surveys | 20 | 19 |
| Total | 23 | 23 |

7

instrument scales used in the survey. The table has classified three concepts within the fifteen topical sections identified in the original list developed by Roth.

Each weighted mean in the first major column section is of the combined scores that represent the sample's responses on the acceptability scale. The wieghted mean formula described in Chapter III was used in computing the combined mean score for the first instrument scale. The concepts were then arranged in descending order of mean scores within the topical sections.

The data in columns two and three of Table 3 are identified with current usage and software factor scales. The data included represent the distribution of the combined mean scores of responses for scales two and three respectively. The combined mean score indicated for each concept was computed using the computer program and formula also described in Chapter III. The reader is, however, reminded that the mean scores in sections two and three are not weighted. The data in these sections of the table are not arranged in descending order of mean scores. Rather, they are arranged to correspond to the concepts ordered under scale one for ease of interpretation.

Table 3 also shows the frequency distribution of scores received within the scales for the three concepts.

## The Survey Scales Results

The sample of teachers was asked to respond to the three survey scales for each of the one hundred and eleven concepts on the survey instrument list.

TABLE 3

THE TABULATION OF SCORES AND MEANS ON AN ENVIRONMENTAL EDUCATION CONCEPTS LIST

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Environmental Management | | | | | | | | | | | | | | | | |
| Modern man affects the structure of his environment. | 8 | 7 | 3 | 1 | 0 | 4.2 | 1 | 5 | 7 | 5 | 1 | 3.0 | 16 | 2 | [illegible] | 2.8 |
| Resource depletion can be slowed by the development and adoption of alternatives. | 4 | 12 | 3 | 0 | 0 | 4.1 | 1 | 5 | 5 | 7 | 1 | 2.9 | 15 | 3 | 1 | 2.8 |
| Environmental management involves the application of knowledge from many different disciplines. | 6 | 9 | 2 | 2 | 0 | 4.0 | 0 | 4 | 8 | 5 | 2 | 2.7 | 12 | 6 | 1 | 2.6 |
| Man has ability to manipulate and change the environment. | 8 | 5 | 4 | 2 | 0 | 4.0 | 3 | 3 | 7 | 5 | 1 | 3.1 | 14 | 4 | 1 | 2.7 |
| Esthetic resources and recreational facilities of economic and noneconomic value are becoming increasingly important in leisure-time activities. | 7 | 6 | 4 | 2 | 0 | 3.9 | 2 | 5 | 6 | 3 | 3 | 3.0 | 12 | 6 | 1 | 2.6 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| The management of natural resources to meet the needs of successive generations demands long range planning. | 6 | 6 | 6 | 1 | 0 | 3.9 | 2 | 2 | 8 | 4 | 3 | 3.1 | 17 | 1 | 1 | 2.8 |
| Social and technological changes alter the interrelationships, importance, and uses for natural resources. | 4 | 9 | 6 | 0 | 0 | 3.9 | 8 | 2 | 12 | 3 | 2 | 2.7 | 17 | 2 | 1 | 2.5 |
| Man has been a factor affecting plant and animal succession and environmental processes. | 3 | 10 | 6 | 0 | 0 | 3.8 | 1 | 3 | 9 | 3 | 2 | 2.9 | 15 | 1 | 2 | 2.9 |
| Man's need for food, fiber, and minerals increases as populations expand and levels of consumption rise. | 5 | 7 | 5 | 2 | 0 | 3.8 | 2 | 8 | 6 | 3 | 2 | 2.5 | 12 | 5 | 2 | 2.5 |
| There are certain risks taken, and limitations experienced when manipulating the natural environment. | 6 | 7 | 4 | 1 | 1 | 3.5 | 0 | 3 | 5 | 6 | 5 | 2.3 | 13 | 5 | 1 | 2.6 |
| A knowledge of social, physical, and biological sciences and humanities are important for environmental understanding. | 5 | 2 | 8 | 3 | 0 | 3.5 | 0 | 1 | 9 | 4 | 5 | 2.3 | 9 | 9 | 1 | 2.5 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective. | 1 | 7 | 9 | 2 | 0 | 3.4 | 0 | 2 | 5 | 9 | 3 | 2.3 | 11 | 7 | 1 | 2.5 |
| Environmental management has effects on individuals and social institutions. | 2 | 6 | 8 | 2 | 1 | 3.0 | 0 | 2 | 6 | 6 | 5 | 2.3 | 9 | 7 | 3 | 2.3 |
| A cultural and time lag exists between the development of knowledge to science and technology and application of that knowledge to resource and environmental problems. | 2 | 5 | 9 | 2 | 1 | 2.9 | 0 | 3 | 5 | 9 | 2 | 2.5 | 13 | 3 | 3 | 2.5 |
| Conflicts emerge between private land use rights and maintenance of environmental quality for the general public. | 1 | 6 | 5 | 3 | 4 | 1.6 | 0 | 1 | 2 | 7 | 9 | 1.7 | 7 | 6 | 6 | 2.1 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| The management of natural resources is culture bound. | 9 | 7 | 2 | 6 | 4 | 1.4 | 0 | 2 | 8 | 6 | 3 | 2.5 | 12 | 5 | 2 | 2.5 |
| Management Technology | | | | | | | | | | | | | | | | |
| Architecture can be one of the positively persuasive influences in developing a congenial environment. | 2 | 9 | 6 | 2 | 0 | 3.6 | 0 | 1 | 4 | 8 | 6 | 2.0 | 6 | 8 | 5 | 2.1 |
| Options available to future generations must not be foreclosed. | 3 | 9 | 5 | 1 | 1 | 3.3 | 0 | 3 | 6 | 7 | 3 | 2.5 | 9 | 9 | 1 | 2.4 |
| Increased population mobility is changing the nature of the demands upon some resources. | 3 | 3 | 8 | 4 | 1 | 2.8 | 0 | 3 | 4 | 4 | 8 | 2.1 | 9 | 9 | 1 | 2.4 |
| A variety of institutional structures is involved in planning and managing the environment. | 3 | 3 | 6 | 5 | 2 | 2.4 | 0 | 3 | 3 | 5 | 8 | 2.0 | 7 | 9 | 3 | 2.3 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Zoning is a practice in which land uses are prescribed based upon value judgements regarding the needs of society. | 3 | 3 | 3 | 8 | 2 | 2.2 | 0 | 2 | 2 | 8 | 7 | 1.9 | 6 | 8 | 5 | 2.1 |
| Multiple use is a practice in which a given land area functions in two or more compatible ways. | 2 | 2 | 7 | 4 | 4 | 1.4 | 0 | 1 | 2 | 6 | 10 | 1.7 | 10 | 6 | 3 | 2.4 |
| Hunting regulations are useful in maintaining and restoring populations as well as in distributing the game harvest. | 3 | 3 | 1 | 7 | 5 | 1.0 | 0 | 5 | 3 | 4 | 11 | 1.7 | 8 | 6 | 5 | 2.2 |
| Management of habitat is considered to be an effective technique of wildlife management when the desire is to increase numbers of particular populations. | 2 | 1 | 3 | 7 | 6 | .4 | 0 | 0 | 3 | 5 | 11 | 1.6 | 6 | 3 | 10 | 1.8 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Economics | | | | | | | | | | | | | | | | |
| Economic efficiency does not always result in conservation of natural resources. | 5 | 5 | 7 | 2 | 0 | 3.7 | 0 | 2 | 7 | 8 | 2 | 2.5 | 15 | 4 | 0 | 2.8 |
| Goods and services are produced by the interaction of labor, capital, natural resources, and technology. | 3 | 5 | 11 | 0 | 0 | 3.6 | 0 | 2 | 5 | 9 | 3 | 2.3 | 14 | 4 | 1 | 2.7 |
| The distribution or location of resources in relation to population, technological, and economic factors are critical to problems of resource conservation and use. | 2 | 7 | 8 | 1 | 0 | 2.6 | 0 | 2 | 2 | 8 | 5 | 2.1 | 12 | 6 | 1 | 2.6 |
| The economy of a region depends on the utilization of its natural, human, and cultural resources and technologies over time. | 3 | 7 | 4 | 5 | 0 | 3.4 | 0 | 2 | 5 | 9 | 3 | 2.3 | 16 | 3 | 0 | 2.8 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Consumption practices are constantly being expanded by our ability to produce and create wants and markets, which affect the rate of resource use. | 2 | 3 | 13 | 0 | 0 | 3.4 | 0 | 3 | 6 | 5 | 2 | 2.7 | 15 | 3 | 1 | 2.7 |
| Long-range planning for the use and allocation of natural and human resources is continually evolving. | 3 | 4 | 8 | 3 | 0 | 3.4 | 0 | 1 | 3 | 6 | 8 | 1.8 | 9 | 9 | 1 | 2.4 |
| The more efficient use of some resources is the result of technical and marketing improvements. | 3 | 8 | 7 | 1 | 0 | 3.3 | 1 | 4 | 4 | 8 | 2 | 2.7 | 12 | 4 | 2 | 2.6 |
| Raw materials and energy suppliers are generally obtained from those resources and places where they are available at least cost, usually in short economic terms. | 1 | 9 | 4 | 4 | 1 | 2.9 | 0 | 1 | 6 | 9 | 3 | 2.3 | 15 | 2 | 2 | 2.7 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Supply and demand, in relation to values held by society, determine what is a resource and its economic values. | 2 | 5 | 8 | 3 | 1 | 2.9 | 1 | 1 | 5 | 8 | 4 | 2.3 | 11 | 6 | 1 | 2.6 |
| Individuals tend to select short-term economic gains, often at the expense of greater long-term environmental benefits. | 4 | 5 | 7 | 1 | 2 | 2.8 | 0 | 1 | 10 | 4 | 4 | 2.4 | 13 | 4 | 2 | 2.6 |
| Outdoor recreation is an increasingly important part of our cultural resources and technologies over time. | 1 | 5 | 8 | 4 | 1 | 2.7 | 0 | 2 | 5 | 5 | 7 | 2.1 | 10 | 6 | 3 | 2.4 |
| Ready transportation, growing interest, money surpluses, and increased leisure time combine to create heavy pressures on existing recreation facilities and demands for new ones. | 3 | 4 | 8 | 2 | 2 | 2.6 | 0 | 4 | 3 | 5 | 7 | 2.2 | 10 | 5 | 4 | 2.3 |

TABLE 3

TABULATION OF SCORES CONTINUED,

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Conservation policy is determined by the interaction of science and technology; social and political factors; and esthetic ethical, and economic considerations. | 3 | 4 | 6 | 3 | 2 | 2.5 | 0 | 2 | 3 | 3 | 9 | 1.9 | 9 | 6 | 4 | 2.3 |
| Choices between needs (essentials) and wants or desires (nonessentials) are often in conflict. | 1 | 8 | 3 | 5 | 2 | 2.4 | 1 | 1 | 5 | 5 | 7 | 2.2 | 10 | 6 | 3 | 2.3 |
| Conventional benefit-cost analysis do not always result in sound conservation decisions. | 1 | 9 | 4 | 2 | 3 | 2.2 | 0 | 2 | 2 | 6 | 9 | 1.8 | 11 | 3 | 5 | 2.4 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Increasing population and per capita use of resources have brought changed land to man or resource to population ratios. | 1 | 4 | 4 | 8 | 2 | 2.0 | 0 | 1 | 2 | 5 | 11 | 1.6 | 8 | 7 | 4 | 2.2 |
| A sound natural resource policy is dependent upon a flexible political system, pragmatically appraising and reappraising policies and programs in terms of their effect upon the public interest and in light of scientific knowledge about the natural resources. | 1 | 4 | 6 | 2 | 5 | 1.0 | 0 | 0 | 2 | 6 | 10 | 1.6 | 8 | 6 | 5 | 2.2 |
| The political and economic strength of a country is, in part, dependent upon its access to domestic and foreign resources and international relationships. | 1 | 4 | 1 | 7 | 5 | .7 | 0 | 3 | 11 | 3 | 11 | 1.8 | 6 | 5 | 8 | 1.9 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Environmental Problems | | | | | | | | | | | | | | | | |
| Safe waste disposal, including the destruction of harmful and cumulative effects of various solids, liquids, gases, radio-active wastes and heat, is important if the well-being of man and the environment is to be preserved. | 9 | 5 | 3 | 1 | 1 | 3.7 | 0 | 5 | 7 | 4 | 3 | 2.7 | 15 | 2 | 1 | 2.8 |
| Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promote increasing environmental contamination. | 11 | 2 | 1 | 4 | 1 | 3.6 | 0 | 3 | 9 | 5 | 2 | 2.7 | 15 | 3 | 0 | 2.8 |
| Pollutants and contaminants are produced by natural and man-made processes. | 8 | 4 | 4 | 2 | 1 | 3.6 | 0 | 5 | 9 | 3 | 2 | 2.9 | 14 | 3 | 1 | 2.7 |

TALBE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Environmental Ecology | | | | | | | | | | | | | | | | |
| Most resources are vulnerable to depletion in quality, quantity, or both. | 9 | 3 | 6 | 0 | 1 | 3.7 | 1 | 4 | 5 | 7 | 2 | 2.7 | 15 | 2 | 1 | 2.8 |
| Natural resources are interdependent and the use or misuse of one will affect others. | 6 | 4 | 8 | 0 | 1 | 3.4 | 0 | 3 | 8 | 5 | 3 | 2.6 | 15 | 2 | 1 | 2.8 |
| The renewable resource base can be extended by reproduction, growth, and management. | 7 | 4 | 3 | 4 | 1 | 3.3 | 0 | 3 | 4 | 8 | 4 | 2.3 | 13 | 4 | 1 | 2.7 |
| Living things are interdependent with one another and their environment. | 3 | 8 | 5 | 2 | 1 | 3.2 | 0 | 4 | 7 | 5 | 2 | 2.7 | 9 | 7 | 2 | 2.4 |
| The natural environment is irreplaceable. | 4 | 4 | 8 | 2 | 1 | 3.1 | 1 | 2 | 4 | 8 | 4 | 2.4 | 11 | 4 | 3 | 2.4 |
| In any environment, one component like space, water, air, or food may become a limiting factor. | 6 | 4 | 6 | 1 | 2 | 2.9 | 1 | 3 | 4 | 7 | 4 | 2.5 | 9 | 5 | 4 | 2.3 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Natural resources, water and minerals in particular, are unequally distributed. | 2 | 3 | 9 | 4 | 1 | 2.7 | 1 | 1 | 5 | 8 | 4 | 2.3 | 12 | 5 | 1 | 2.6 |
| Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts. | 1 | 3 | 2 | 9 | 4 | 1.1 | 0 | 2 | 1 | 6 | 10 | 1.7 | 3 | 9 | 6 | 1.8 |
| Organisms and environments are in constant change. | 1 | 1 | 6 | 7 | 4 | 1.1 | 0 | 0 | 5 | 3 | 11 | 1.7 | 5 | 5 | 8 | 1.8 |
| The form of life present depends upon the coincidence of the life needs and their availability in an environment. | 1 | 1 | 6 | 7 | 4 | 1.1 | 0 | 0 | 1 | 5 | 13 | 1.4 | 4 | 6 | 8 | 1.8 |
| Man is influenced by many of the same hereditary and environmental factors that affect other organisms and their populations. | 1 | 1 | 5 | 8 | 4 | 1.0 | 0 | 0 | 2 | 6 | 11 | 1.5 | 5 | 7 | 6 | 1.9 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Biological systems are described as dynamic because the materials and energy involved are parts of continuous cycles; inorganic materials and energy become part of organic materials and are subsequently broken down into simpler substances and energy as a result of the operation of organic systems. | 1 | 3 | 7 | 3 | 5 | 1.0 | 0 | 2 | 3 | 2 | 11 | 1.7 | 5 | 4 | 9 | 1.8 |
| The interaction of environmental and biological factors determines the size and range of species and populations. | 2 | 2 | 4 | 6 | 5 | .9 | 0 | 1 | 3 | 2 | 13 | 1.6 | 4 | 10 | 4 | 2.0 |
| The rate of change in an environment may exceed the rate of change in an organism. | 2 | 1 | 4 | 7 | 5 | .8 | 0 | 1 | 2 | 5 | 11 | 1.6 | 5 | 6 | 7 | 1.9 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition. | 1 | 2 | 3 | 7 | 5 | .6 | 0 | 0 | 2 | 3 | 14 | 1.4 | 5 | 6 | 7 | 1.9 |
| An organism is the product of its heredity and environment. | 1 | 2 | 6 | 4 | 6 | .4 | 0 | 0 | 3 | 3 | 13 | 1.6 | 4 | 5 | 9 | 1.4 |
| All living things, including man, are continually evolving. | 0 | 3 | 1 | 9 | 6 | .16 | 0 | 0 | 3 | 1 | 15 | 1.4 | 3 | 5 | 10 | 1.6 |
| Animal populations are renewable resources. | 3 | 0 | 6 | 2 | 8 | -.16 | 0 | 2 | 1 | 3 | 13 | 1.6 | 8 | 3 | 7 | 2.1 |
| Natural Resources | | | | | | | | | | | | | | | | |
| The earth and life on it are greatly affected by the atmosphere. | 5 | 6 | 4 | 4 | 0 | 3.6 | 0 | 3 | 5 | 6 | 5 | 2.3 | 12 | 5 | 1 | 2.6 |
| Water is a reusable and transient resource, but the available quantity may be reduced or quality impaired. | 5 | 4 | 6 | 4 | 0 | 3.5 | 1 | 3 | 3 | 7 | 5 | 2.4 | 11 | 6 | 1 | 2.6 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Water supplies, both in quantity and quality, are important to all levels of living. | 5 | 4 | 6 | 3 | 1 | 3.2 | 0 | 5 | 1 | 6 | 7 | 2.2 | 10 | 7 | 1 | 2.5 |
| As populations increase competition for the use of water increases resulting in a need for establishing water use priorities. | 4 | 2 | 7 | 4 | 2 | 2.5 | 1 | 2 | 1 | 5 | 10 | 1.9 | 9 | 5 | 4 | 2.3 |
| The amount of precipiation that becomes available for use by man varies with topography, land use, and applied management practices. | 3 | 3 | 4 | 3 | 6 | .8 | 0 | 2 | 1 | 4 | 12 | 1.6 | 7 | 3 | 8 | 1.9 |
| (Minerals) | | | | | | | | | | | | | | | | |
| Minerals are nonrenewable resources. | 5 | 7 | 5 | 2 | 0 | 3.8 | 0 | 2 | 5 | 8 | 4 | 2.3 | 16 | 2 | 1 | 2.8 |
| Mineral conservation involves the utilization of all known methods of using the minerals of the earth's crust that will cause them to serve more people for a longer time. | 3 | 4 | 10 | 2 | 0 | 3.4 | 0 | 3 | 2 | 8 | 6 | 2.1 | 13 | 5 | 0 | 2.7 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| The nonrenewable resource base is considered finite. | 3 | 5 | 8 | 2 | 1 | 3.0 | 0 | 0 | 6 | 8 | 4 | 2.1 | 8 | 8 | 1 | 2.4 |
| Soil is classified as a renewable resource but, because it may take a few years to thousands of years to be "renewed", it is more practically termed a depletable resource. (Soil) | 2 | 3 | 4 | 6 | 4 | 1.4 | 0 | 1 | 2 | 5 | 11 | 1.6 | 8 | 5 | 6 | 2.1 |
| Maintaining, improving, and in some cases restoring soil productivity is important to the welfare of people. | 3 | 2 | 8 | 4 | 2 | 2.4 | 0 | 0 | 3 | 3 | 13 | 1.5 | 11 | 4 | 4 | 2.5 |
| Soil productivity can be maintained by utilizing known agronomic, mechanical, and chemical processes. | 3 | 1 | 4 | 7 | 4 | 1.3 | 0 | 0 | 2 | 3 | 14 | 1.4 | 11 | 3 | 5 | 2.3 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Geological processes like erosion and deposition modify the landscape. | 2 | 2 | 3 | 7 | 5 | .8 | 0 | 0 | 2 | 5 | 12 | 1.5 | 9 | 4 | 6 | 2.2 |
| (Plants) | | | | | | | | | | | | | | | | |
| Green plants are the ultimate source of food, clothing, shelter, and energy in most societies. | 4 | 1 | 7 | 4 | 3 | 2.0 | 0 | 1 | 2 | 6 | 10 | 1.7 | 10 | 6 | 3 | 2.4 |
| Energy is supplied to an ecosystem by the activities of green plants. | 4 | 2 | 6 | 2 | 5 | 1.3 | 0 | 0 | 3 | 5 | 11 | 1.6 | 9 | 4 | 6 | 2.2 |
| Plants are renewable resources. | 3 | 2 | 8 | 1 | 5 | 1.3 | 0 | 0 | 6 | 5 | 8 | 1.9 | 10 | 4 | 5 | 2.3 |
| (Animals) | | | | | | | | | | | | | | | | |
| Wildlife is considered to be a public resource. | 1 | 1 | 6 | 5 | 6 | .4 | 0 | 0 | 2 | 6 | 11 | 1.5 | 7 | 3 | 9 | 1.9 |
| Wildlife populations are important economically, esthetically, and biologically. | 2 | 1 | 3 | 7 | 6 | .4 | 0 | 0 | 3 | 5 | 11 | 1.6 | 7 | 3 | 9 | 1.9 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Wildlife refuges, undisturbed natural areas, and preserves may be of value in protecting endangered species and perpetuating the gene pool. | 2 | 1 | 3 | 5 | 8 | -.4 | 0 | 0 | 1 | 7 | 11 | 1.5 | 6 | 5 | 8 | 1.9 |
| The Socio-Cultural Environment | | | | | | | | | | | | | | | | |
| Man has responsibility to develop an appreciation of and respect for the rights of others. | 6 | 6 | 6 | 1 | 0 | 3.9 | 0 | 4 | 8 | 4 | 3 | 3.7 | 15 | 2 | 2 | 2.7 |
| Individual citizens should be stimulated to become well informed about resource issues, problems, management procedures, and ecological principles. | 4 | 8 | 6 | 1 | 0 | 3.8 | 0 | 4 | 7 | 6 | 7 | 2.7 | 15 | 3 | 1 | 2.7 |
| Conservation responsibilities should be shared by individuals, businesses and industries, special interest groups, and all levels of government and education. | 5 | 7 | 5 | 2 | 0 | 3.8 | 0 | 2 | 8 | 5 | 4 | 2.4 | 13 | 5 | 1 | 2.6 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Man is developing the technical and sociological knowledge needed to control population growth, modify environment, and alter resource use patterns. | 4 | 4 | 7 | 4 | 0 | 3.4 | 1 | 2 | 4 | 8 | 4 | 2.4 | 16 | 2 | 1 | 2.8 |
| Man has a moral responsibility for his environment decisions. | 5 | 3 | 8 | 2 | 1 | 3.2 | 0 | 2 | 6 | 9 | 2 | 2.4 | 12 | 7 | 0 | 2.6 |
| Public opinion constitutes a control over the use of conservation practices. | 3 | 1 | 7 | 5 | 3 | 1.8 | 0 | 2 | 1 | 9 | 7 | 2.0 | 11 | 4 | 4 | 2.4 |
| Social values and mores influence personal conservation behavior. | 2 | 2 | 3 | 9 | 3 | 1.6 | 0 | 2 | 1 | 11 | 5 | 2.0 | 11 | 5 | 3 | 2.4 |
| Knowledge of social structures, institutions, and culture of a society must be brought to bear on environmental considerations. | 1 | 4 | 5 | 5 | 4 | 1.4 | 0 | 0 | 3 | 7 | 9 | 1.7 | 7 | 9 | 3 | 2.2 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| In a democracy, a basic theory is that increasing restrictions on resource allocation and use are imposed by the consent or insistence of the people. | 1 | 2 | 4 | 7 | 5 | .7 | 0 | 1 | 0 | 8 | 10 | 1.6 | 6 | 6 | 7 | 1.9 |
| The relationships between man and the natural environment are mediated by his culture. | 3 | 0 | 7 | 3 | 6 | .6 | 0 | 0 | 4 | 4 | 11 | 1.6 | 7 | 7 | 5 | 2.1 |
| Culture | | | | | | | | | | | | | | | | |
| Historically, cultures with high technological development have used more natural resources than those with lower levels of technological development. | 4 | 2 | 6 | 6 | 1 | 2.8 | 0 | 2 | 7 | 6 | 4 | 2.4 | 15 | 3 | 1 | 2.7 |
| Human resources include the physical and mental abilities with which man is endowed and the knowledge he has generated. | 4 | 3 | 3 | 6 | 3 | 2.0 | 0 | 2 | 2 | 9 | 6 | 2.0 | 10 | 5 | 4 | 2.3 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Man has psycobiological and bio-social needs. | 3 | 0 | 3 | 7 | 6 | .4 | 0 | 0 | 4 | 3 | 12 | 1.6 | 5 | 3 | 11 | 1.7 |
| The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny. | 1 | 2 | 1 | 8 | 7 | -.2 | 0 | 1 | 3 | 3 | 12 | 1.6 | 3 | 5 | 11 | 1.6 |
| Politics | | | | | | | | | | | | | | | | |
| As populations increase and/or as resource supplies decrease, the freedom of the individual to use the resources as he wishes decreases irrespective of the form of government. | 4 | 4 | 6 | 4 | 1 | 3.0 | 0 | 4 | 3 | 4 | 8 | 2.2 | 13 | 3 | 3 | 2.5 |
| Policies, including natural resource policies, came about as the result of interacting social processes: science and technology, government operations, private interests, and public attitudes. | 3 | 3 | 7 | 3 | 3 | 2.0 | 0 | 0 | 5 | 5 | 9 | 1.8 | 8 | 5 | 6 | 2.1 |
| Conservation policies are often the result of group action. | 1 | 3 | 4 | 8 | 3 | 1.6 | 0 | 1 | 3 | 4 | 11 | 1.7 | 9 | 5 | 5 | 2.2 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| We have "legal" ownership of some resources like real estate and control over others during our lifetime but ethically we are "stewards" rather than owners of the resource base. | 1 | 5 | 4 | 5 | 4 | 1.4 | 0 | 2 | 2 | 6 | 9 | 1.8 | 8 | 7 | 4 | 2.2 |
| Individual citizens should be stimulated to become active in political process. | 3 | 0 | 4 | 6 | 6 | .5 | 1 | 1 | 2 | 6 | 10 | 1.6 | 5 | 3 | 11 | 1.7 |
| The Family | | | | | | | | | | | | | | | | |
| Man has the capability of improving society through sociology, psychology, and science. | 3 | 2 | 9 | 3 | 2 | 2.4 | 0 | 1 | 9 | 3 | 6 | 2.3 | 11 | 5 | 3 | 2.4 |
| Man performs some tasks at a high physiological cost. | 5 | 2 | 4 | 5 | 3 | 2.1 | 1 | 1 | 4 | 4 | 9 | 2.0 | 10 | 4 | 5 | 2.3 |
| An individual must develop his ability to perceive if he is to increase his awareness and develop environmental perspectives. | 5 | 1 | 5 | 5 | 3 | 2.1 | 1 | 3 | 2 | 2 | 11 | 2.0 | 11 | 4 | 4 | 2.4 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Individuals perceive different self-roles depending upon their position in the social and environmental context. | 3 | 3 | 3 | 6 | 4 | 1.5 | 0 | 3 | 2 | 4 | 10 | 1.9 | 10 | 3 | 6 | 2.2 |
| Man is continually developing an ethical base for making value judgements. | 2 | 3 | 3 | 5 | 6 | .6 | 0 | 3 | 2 | 4 | 10 | 1.9 | 5 | 6 | 8 | 1.9 |
| Man is a high animal form because of his ability to reason. | 2 | 1 | 4 | 2 | 10 | -1.1 | 0 | 2 | 3 | 1 | 13 | 1.7 | 4 | 5 | 10 | 1.7 |
| Family planning and the limiting of family size are important if over-population is to be avoided and a reasonable standard of living assured for successive generations. | 1 | 1 | 4 | 3 | 10 | -1.2 | 0 | 0 | 1 | 3 | 15 | 1.3 | 4 | 2 | 13 | 1.3 |

TABLE 3

TABULATION OF SCORES CONTINUED

| Environmental Management Education Concepts | Acceptability | | | | | | Current Usage | | | | | | Software Factor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Essential | Highly Acceptable | Desireable | Acceptable | Unacceptable | Combined Weighted Mean Score | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Combined Mean Score | Yes | Undecided | No | Combined Mean Score |
| Psychological Aspects | | | | | | | | | | | | | | | | |
| Resources have a psychological impact on people. | 4 | 1 | 6 | 4 | 4 | 1.6 | 0 | 3 | 1 | 5 | 10 | 1.9 | 10 | 4 | 5 | 2.3 |
| Opportunities to experience and enjoy nature are psychologically rewarding to many and are important to mental health. | 4 | 1 | 5 | 4 | 5 | 1.2 | 0 | 0 | 4 | 5 | 10 | 1.9 | 10 | 4 | 5 | 2.3 |
| Emotional reactions can be elicited by exposure to physical objects and geometric forms. | 4 | 3 | 4 | 2 | 6 | .9 | 1 | 3 | 2 | 4 | 9 | 2.1 | 11 | 3 | 5 | 2.3 |
| The need of man to turn inward for self-renewal can be stimulated by his external esthetic experience. | 4 | 1 | 3 | 3 | 8 | -.1 | 0 | 3 | 3 | 2 | 11 | 1.9 | 7 | 4 | 8 | 1.9 |

Roth, R.E., Environmental Management Concepts--A List, Wisconsin University Madison Research and Development Center for Cognitive Learning, 1970.

Scale I, Acceptability:

How acceptable is the concept to the multiple activity industrial arts program in the Province of Alberta?

Table 4, which shows the means of the combined weighted sample scores on the first survey scale, indicates that the sample of teachers judged four of the environmental education concepts in the category between highly acceptable and essential. Thirty-eight of the concepts were judged by the respondents as falling in the category between desireable and highly acceptable. Twenty-eight concepts were judged between satisfactory and desireable. Forty-one of the environmental management education concepts were judged less than satisfactory by the sample.

Scale II, Current Usage:

To what degree is the concept or a variation of the concept currently being used in your program of I.A.?

The combined mean scores of the respondents' scores on this scale were also computed for each of the one hundred and eleven variables. The formula for the computation of the wieghted means for this scale was not employed.

Table 4 describes the resultant combined mean scores taken from scale II. It indicates the sample's judgement of four of the environmental education concepts places them in the category between frequently mentioned and sometimes mentioned. Fifty-seven of the concepts were judged between rarely and sometimes mentioned. Fifty of the concepts were judged by the respondents as being content that is less than rarely mentioned in their industrial arts programs.

Scale III, Software Factor:

If soft-ware were made available to clarify methods of using the concept, would your rating on the second scale change?

Table 4 shows the combined mean scores of the responses to scale III. These mean scores were also computed and tabulated in the same manner as the result scores from Scale II.

The results indicated that the sample judged ninety-eight concepts affirmatively to undecided on the third instrument scale. The remaining twenty-three concepts were judged as undecided to negatively on the third scale.

Table 5 has ordered in a descending arrangement using the weighted means of scores of the first instrument question, one hundred and eleven environmental concepts.

For ease in observing response of the first instrument scale to the responses of the second and third scales, two additional sections have been included. The sections include combined means scores of responses to the second and third instrument scales.

Analysis within Topical Sections

The findings tabulated under scale one of Table 6 indicate that the concepts categorized under Environmental Management, Environmental Problems, Socio-Cultural, Natural Resources and Minerals received greater percentages of favorable scores on all three scales.

The sample tended to judge the concepts categorized under Economics, and Environmental Ecology less favorably then the ones

TABLE 4

MEAN RESPONSES WITHIN THE SURVEY SCALES

| Categories of Options Available Within Each Scale | Number of Combined Means Located Within Each Category |
|---|---|
| **Results of Scale I, Acceptability** [a] | |
| Essential to Highly Acceptable | 4 |
| Highly Acceptable to Desirable | 38 |
| Desirable to Satisfactory | 28 |
| Less than Satisfactory | 41 |
| **Results of Scale II, Current Usage** | |
| Used to Initiate Instruction to Frequently Mentioned | 0 |
| Frequently Mentioned to Sometimes Mentioned | 4 |
| Sometimes Mentioned to Rarely Mentioned | 57 |
| Less than Rarely Mentioned | 50 |
| **Results of Scale III, Software Factor** | |
| Yes to Undecided | 98 |
| Undecided to No | 23 |

[a] Combined mean score are weighted as described in Chapter III for Scale I.

TABLE 5

THE RANKING OF 111 ENVIRONMENTAL MANAGEMENT EDUCATION CONCEPTS BY COMBINED WEIGHTED MEANS OF ACCEPTABILITY SCORES

| Environmental Management Education Concept Number as Used on the Instrument | Acceptability Combined Weighted Item MEAN Score | Current Usage Combined MEAN Score | Software Factor Combined MEAN Score |
|---|---|---|---|
| 5 | 4.158 | 3.000 | 2.789 |
| 11 | 4.053 | 2.89 | 2.737 |
| 4 | 4.000 | 2.73 | 2.579 |
| 7 | 4.000 | 3.10 | 2.684 |
| 6 | 3.947 | 3.00 | 2.579 |
| 3 | 3.895 | 2.789 | 2.842 |
| 9 | 3.895 | 2.737 | 2.895 |
| 82 | 3.895 | 3.684 | 2.684 |
| 2 | 3.842 | 2.889 | 2.722 |
| 73 | 3.789 | 1.474 | 2.368 |
| 72 | 3.789 | 2.263 | 2.789 |
| 83 | 3.789 | 2.684 | 2.737 |
| 84 | 3.789 | 2.421 | 2.632 |
| 44 | 3.737 | 2.737 | 2.778 |
| 29 | 3.684 | 2.474 | 2.789 |
| 49 | 3.684 | 2.737 | 2.778 |
| 65 | 3.632 | 2.316 | 2.611 |
| 24 | 3.579 | 2.421 | 2.667 |
| 38 | 3.579 | 2.316 | 2.684 |
| 46 | 3.579 | 2.684 | 2.833 |
| 30 | 3.556 | 2.059 | 2.579 |
| 10 | 3.526 | 2.316 | 2.632 |
| 45 | 3.526 | 2.895 | 2.722 |
| 66 | 3.526 | 2.368 | 2.556 |

TABLE 5

RANKING OF SCORES CONTINUED

| Environmental Management Education Concept Number as Used on the Instrument | Acceptability Combined Weighted Item MEAN Score | Current Usage Combined MEAN Score | Software Factor Combined MEAN Score |
|---|---|---|---|
| 8 | 3.500 | 2.316 | 2.421 |
| 28 | 3.421 | 2.316 | 2.842 |
| 47 | 3.421 | 2.579 | 2.778 |
| 69 | 3.421 | 2.105 | 2.722 |
| 88 | 3.421 | 2.368 | 2.789 |
| 35 | 3.389 | 2.667 | 2.737 |
| 39 | 3.389 | 1.833 | 2.421 |
| 16 | 3.368 | 2.316 | 2.526 |
| 19 | 3.316 | 2.474 | 2.421 |
| 43 | 3.316 | 2.684 | 2.556 |
| 52 | 3.316 | 2.316 | 2.667 |
| 1 | 3.211 | 2.722 | 2.389 |
| 64 | 3.158 | 2.211 | 2.500 |
| 85 | 3.158 | 2.421 | 2.632 |
| 54 | 3.105 | 2.632 | 2.444 |
| 70 | 3.053 | 2.111 | 2.412 |
| 12 | 3.000 | 2.263 | 2.316 |
| 100 | 3.000 | 2.158 | 2.526 |
| 15 | 2.947 | 2.474 | 2.526 |
| 41 | 2.947 | 2.263 | 2.684 |
| 48 | 2.947 | 2.474 | 2.278 |
| 42 | 2.895 | 2.316 | 2.556 |
| 18 | 2.842 | 2.105 | 2.421 |
| 36 | 2.789 | 2.421 | 2.579 |
| 95 | 2.789 | 2.368 | 2.737 |
| 27 | 2.737 | 2.105 | 2.368 |

TABLE 5

RANKING OF SCORES CONTINUED

| Environmental Management Education Concept Number as Used on the Instrument | Acceptability Combined Weighted Item MEAN Score | Current Usage Combined MEAN Score | Softwater Factor Combined MEAN Score |
|---|---|---|---|
| 51 | 2.737 | 2.316 | 2.611 |
| 26 | 2.579 | 2.211 | 2.316 |
| 32 | 2.500 | 1.881 | 2.263 |
| 67 | 2.474 | 1.895 | 2.278 |
| 40 | 2.421 | 2.158 | 2.368 |
| 104 | 2.421 | 2.263 | 2.421 |
| 20 | 2.368 | 2.053 | 2.211 |
| 73 | 2.368 | 1.474 | 2.368 |
| 25 | 2.211 | 1.947 | 2.053 |
| 33 | 2.211 | 1.842 | 2.316 |
| 107 | 2.105 | 2.000 | 2.263 |
| 37 | 2.053 | 1.632 | 2.211 |
| 98 | 2.053 | 1.789 | 2.105 |
| 102 | 2.053 | 2.000 | 2.368 |
| 76 | 2.000 | 1.684 | 2.368 |
| 94 | 2.000 | 2.000 | 2.316 |
| 90 | 1.842 | 1.895 | 2.368 |
| 14 | 1.579 | 1.737 | 2.053 |
| 89 | 1.579 | 2.000 | 2.421 |
| 99 | 1.579 | 1.684 | 2.211 |
| 110 | 1.579 | 1.842 | 2.263 |
| 103 | 1.474 | 1.895 | 2.211 |
| 22 | 1.421 | 1.684 | 2.368 |
| 97 | 1.421 | 1.842 | 2.211 |
| 17 | 1.368 | 2.000 | 2.053 |

TABLE 5

RANKING OF SCORES CONTINUED

| Environmental Management Education Concept Number as Used on the Instrument | Acceptability Combined Weighted Item MEAN Score | Current Usage Combined MEAN Score | Software Factor Combined MEAN Score |
|---|---|---|---|
| 71 | 1.368 | 1.632 | 2.105 |
| 86 | 1.368 | 1.684 | 2.211 |
| 75 | 1.316 | 1.368 | 2.316 |
| 78 | 1.316 | 1.579 | 2.158 |
| 77 | 1.263 | 1.895 | 2.263 |
| 108 | 1.158 | 1.895 | 2.263 |
| 53 | 1.105 | 1.737 | 1.833 |
| 58 | 1.105 | 1.684 | 1.833 |
| 60 | 1.105 | 1.368 | 1.778 |
| 56 | 1.053 | 1.526 | 1.944 |
| 21 | 1.000 | 1.684 | 2.158 |
| 34 | 1.000 | 1.556 | 2.158 |
| 61 | 1.000 | 1.737 | 1.778 |
| 111 | .947 | 2.105 | 2.316 |
| 50 | .895 | 1.579 | 2.000 |
| 74 | .842 | 1.474 | 2.158 |
| 57 | .789 | 1.632 | 1.889 |
| 68 | .789 | 1.632 | 1.944 |
| 91 | .737 | 1.579 | 1.947 |
| 31 | .722 | 2.263 | 1.895 |
| 87 | .632 | 1.632 | 2.105 |
| 63 | .611 | 1.638 | 1.889 |
| 106 | .579 | 1.895 | 1.842 |
| 55 | .474 | 1.632 | 1.722 |
| 96 | .474 | 1.684 | 1.684 |

TABLE 5

RANKING OF SCORES CONTINUED

| Environmental Management Education Concept Number as Used on the Instrument | Acceptability Combined Weighted Item MEAN Score | Current Usage Combined MEAN Score | Softwater Factor Combined MEAN Score |
|---|---|---|---|
| 93 | .421 | 1.579 | 1.684 |
| 23 | .368 | 1.579 | 1.789 |
| 80 | .368 | 1.579 | 1.895 |
| 81 | .368 | 1.526 | 1.895 |
| 59 | .158 | 1.368 | 1.611 |
| 109 | -.53 | 1.895 | 1.947 |
| 62 | -.158 | 1.579 | 2.056 |
| 92 | -.158 | 1.632 | 1.579 |
| 79 | -.368 | 1.474 | 1.895 |
| 105 | -1.053 | 1.684 | 1.684 |
| 101 | -1.211 | 1.263 | 1.526 |

TABLE 6

THE TABULATION OF SCORES WITHIN TOPICAL SECTIONS

| Categories Within the Concepts Lists | Numbers of Concepts | Scale I Acceptability | | | | | Scale II Usage | | | | | Scale III Software Factor | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Essential | Highly Acceptable | Desirable | Satisfactory | Unacceptable | Initiates Instruction | Frequently Mentioned | Sometimes Mentioned | Rarely Mentioned | Never Mentioned | Yes | Undecided | No |
| Environmental Management | 16 | .25 | .36 | .27 | .09 | .04 | .04 | .16 | .34 | .30 | .16 | .67 | .24 | .09 |
| Management Technology | 8 | .14 | .22 | .26 | .25 | .14 | 0 | .12 | .17 | .30 | .41 | .40 | .38 | .22 |
| Economics | 18 | .12 | .30 | .35 | .16 | .08 | .01 | .10 | .26 | .34 | .32 | .60 | .26 | .14 |
| Environmental Problems | 3 | .49 | .19 | .14 | .12 | .05 | 0 | .23 | .44 | .21 | .12 | .81 | .15 | .04 |
| Environmental Ecology | 18 | .15 | .14 | .28 | .24 | .19 | .01 | .08 | .18 | .26 | .46 | .42 | .29 | .29 |
| Natural Resources | 5 | .23 | .20 | .28 | .19 | .09 | .02 | .16 | .12 | .29 | .41 | .54 | .29 | .17 |
| (Minerals) | 4 | .17 | .25 | .36 | .16 | .07 | 0 | .08 | .20 | .39 | .33 | .62 | .27 | .11 |
| (Soil) | 3 | .14 | .09 | .26 | .32 | .19 | 0 | 0 | .12 | .19 | .68 | .54 | .19 | .26 |
| (Animals) | 3 | .19 | .09 | .35 | .12 | .23 | 0 | .02 | .19 | .28 | .51 | .51 | .25 | .25 |
| (Plants) | 3 | .09 | .05 | .21 | .30 | .35 | 0 | 0 | .11 | .32 | .58 | .35 | .19 | .46 |
| Socio-Cultural | 10 | .18 | .20 | .31 | .21 | .12 | .01 | .10 | .22 | .36 | .32 | .59 | .26 | .14 |
| Cultural | 4 | .16 | .09 | .17 | .36 | .22 | .0 | .07 | .21 | .28 | .45 | .43 | .21 | .36 |
| Politics | 5 | .13 | .16 | .26 | .27 | .18 | .01 | .08 | .16 | .26 | .49 | .45 | .24 | .30 |
| Family | 7 | .16 | .10 | .24 | .22 | .29 | .02 | .10 | .17 | .16 | .56 | .41 | .22 | .37 |
| Psychological Aspects | 4 | .21 | .08 | .24 | .17 | .30 | .01 | .10 | .13 | .21 | .53 | .50 | .20 | .30 |
| Total % | | 18 | 21 | 28 | 20 | 14 | 1 | 11 | 23 | 30 | 35 | 53 | 26 | 21 |

mentioned above.

The concepts categorized under the topics of (Soil), (Animals), (Plants), Culture, Politics, Family, and Psychological aspects received percentages of scores that indicated the existence of strong positive and negative opinions on the "acceptability" and "software factor" scales. These scores tend to verify the researcher's interview finding that the sample of teachers had diverse views concerning the infusion of the group of environmental concepts into industrial arts education.

The total percentage findings tabulated under the "usage" scale indicates that Environmental Management Education Concepts do not appear to be currently receiving a high degree of emphasis in the multiple activity programs that the sample of teachers are teaching. An exception to this finding, however, exists for the concepts categorized under Environmental Problems. There, a sixty-seven percentage of responses by the teachers, appears to indicate that those concepts are at least sometimes mentioned in the sample's industrial arts programs. The total percentage findings on Table 5 show that over half of the response to Scale III were affirmative. When asked that question, fifty-three percent of the responses given were yes, twenty-six percent of the responses were undecided, and twenty-one percent of the responses were no.

## Opinions from the Non-directive Interview

Swan (1974, p.39) points out that consideration must be paid

to every aspect of human behavior when developing environmental education programs. Certainly human perceptions which often determine behavior of teachers are also considerations that must be recognized prior to the development of educational programs.

The following section represents the transcribed comments, suggestions, and concerns related to the researcher during the course of the survey. As the information was arrived at through the non-directive interview process, the comments may not in all cases represent the opinions of the total sample. The comments however, are those most mentioned and most relevant to the topic being studied.

There was initial agreement among teachers that environmental education content was needed in industrial arts. However, the majority of the sample qualified this general view. The development of other concerns in I.A. such as skills, competencies in the use of tools, machinery, materials and industrial process were most often cited as taking precedence over the introduction of environmental education content.

A second qualification that concerned the comparative flexibility of the junior high and senior high I.A. courses was clearly made by junior high school teachers. In making a comparison, the junior high school teachers stated they felt that high school programs could be more flexible in interpreting environmental education content than junior high school. Teachers stated that because of the nature and especially the age of the junior high student, industrial arts had to be primarily activity oriented. This orienta-

tion required greater emphasis on developing safe work habits and skills necessary to effectively use the laboratory to develop "tangible, take home" type of products. Junior high school students "looked for this orientation in I.A." With priorities arranged in such a fashion the teachers stated that the time constraint prevented the teacher from introducing other information such as environmental education content.

Teachers within the sample stated that they felt environmental education content could be better introduced after the beginning junior high courses in I.A. had been completed. They stated that once students could use the laboratory, they could be better able to possibly develop knowledge related to the other curriculum concerns of schools.

Designs for programs that would integrate the instruction of the remainder of the curriculum were mentioned by teachers. This flexibility for such designs again appeared to be limited to high school settings. Ed. I.A. 360, a course offered at the University of Alberta, was often favorably mentioned by teachers in relation to these comments.

It was pointed out by the instructors that many of the concepts may have been related to students in ways other than through teaching. Examples, indirect comments and methods used in organization of the industrial arts courses were mentioned in this context.

Specific examples that were cited by the instructors were organized activities within the laboratory. Concept number five,

"Modern man effects the structure of his environment."

was frequently mentioned in reference to clean-up schedules. Concepts forty-nine and seventy-two,

> "Most resources are vulnerable to depletion in quality, quantity or both."

and

> "Minerals are non-renewable resources."

were frequently mentioned by the teachers in relation to comments made to students when discussing or describing the management of laboratory supplies.

A small number of instructors indicated that many of the concepts on the list contained societal values that had been accepted and used throughout their teaching in the above way. The result was described as the usage of the value ladened concepts without the conscious acknowledgement of its significance, or the use of a concept without the deliberate intent to use it in instruction. The following comment was typical of this description:

> ...All the concepts were true and applicable. The degree of interpretation and bias of the individual instructor was a factor which would decide its applicability... .

Teachers often mentioned the various forms of media as factors that influenced their students' knowledge of environmental problems. These teachers stated that as a consequence of this effect, environmental content was easier to reinforce in laboratories. Recycling of scraps and used materials was an example cited in this instance.

During the course of the interviews with the sample, a number of teachers expressed concern for the role industrial arts

education plays in relation to modern technological and environmental implications.

Concern was expressed over the fact that Alberta was not as large an industrialized sector of Canada as Southern Ontario or Southern Quebec. Consequently, the relevancy of both industry and environmental effects related to industry was removed from many of the students in the rural areas of Alberta. The geographic background experience of the instructor was also viewed by a respondent as a factor that influenced the adoption of environmental education content in I.A. However, because there were differing "common denominators" the process of arriving at a suitable program to interpret all the environmental technological information necessary was described as being most difficult.

As the interviews with the teachers involved discussions concerning suggestions of how environmental education could be implemented, the following comments were most frequently made.

> ...Would like to see some materials developed that teachers could use, result from your study...
>
> ...Communication between the Department of Education, the university, and teachers is essential for the development of the environmental education and industrial arts beyond just theory...
>
> ...The process and research really has to be picked up by the university...
>
> ...You really would have to know both your kids and the whole environment scene to do a good job...
>
> ...Teachers could be a little more involved in the design of this material...

> ...The development of environmental awareness and learning of positive attitudes that are needed requires much more time than is available in a unit of a course...
>
> ...I would love to get into this area if the time were made available for the development work...
>
> ...Such programs would have to start with smaller classrooms...You couldn't introduce that type of information to a class as large as this...

The comments to the research also indicate negative orientations concerning the interfacing of environmental education to industrial arts.

> ...It is really what is needed but you will never see it. You can never get industrial arts instructors to agree to much of this information...
>
> ...The concepts are very broad and general. I don't see any relevance to industrial arts, really. Industrial arts is a place for students to come in and make things...
>
> ...This information is more useful for science or social studies, not I.A. ...
>
> ...The priority interest areas of other teachers teaching other subjects would prevent you from using this orientation in I.A. ...
>
> ...It is really not the role of I.A. to teach environmental education concepts, especially those that involve political beliefs...

# CHAPTER V

# SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

## Introduction to the Summary

Technology as a tool has been used by man to shape the environment in which he lives. Because the degree to which man has been able to master this tool has determined the quality of life he experiences, technology has been looked upon favorably. By the end of the last decade, however, questions were raised by social critics concerning technology and its effects on the future of mankind. These questions were the result of both catastrophic events and predictions that placed a limit on the continued existence of the quality standard of living experienced in industrial nations.

Industry, a component of technology, has received much attention for its role in environmental degradation. The industrial communities that had historically been largely unconcerned about the degrading environment were suddenly confronted with a public that began taking recognition of serious environmental matters. In more recent years man has witnessed a social awakening to many such environmental issues.

As societal issues and concerns have historically been quickly adopted by the educational community, so have educators found a need to look at the environmental degradation.

Environmental education has become the title for educational content designed to be used in educational settings. Its intent is to acquaint students of the holistic description of man's interaction with his environment. The influence of environmental education content has been perceived as needed in all aspects of education. In Alberta, educational planners have viewed environmental education as a necessary component within the curriculum design. Industrial arts education has been specifically cited in this context.

Industrial arts in the province of Alberta deals with aspects of industry and is uniquely defined to allow much flexibility in interpreting the other curricular subjects of the school.

With the recommendation to include environmental education content in industrial arts, fundamental questions were asked. One question that this study has dealt with is how teachers perceive environmental education content for their programs.

It has been the belief of the researcher that the perceptions and opinions of teachers have an effect on what they teach. This study has sought to describe the opinions which need consideration prior to effective planning and/or further research.

## Related Literature

Literature related to the need for environmental education and the development of environmental education content was

reviewed. This review served the purpose of providing a knowledge background in a previously unfamiliar area to the researcher. It allowed the researcher to locate several studies which had been conducted in a parallel fashion to this survey. From the literature the Roth study emerged as having the most representative list of environmental education concepts.

Design of the Study

It was decided to use the Roth instrument as a base for the design of a survey that would gather Alberta industrial arts teachers' opinions on the acceptability of environmental education concepts to programs of multiple activity industrial arts in their province.

A review panel was employed to establish validity of the instrument as well as make suggestions relating to design for the survey. The instrument designed by Roth was modified by the addition of two scales. The total survey interaction included the modified Roth instrument and a non-directive interview. The interview allowed the researcher to collect both opinions on the list of concepts and additional concerns stated by the instructors. The survey was conducted in homes and schools of the teachers after having received approval from all parties directly involved.

Analysis of the results of the survey included the tabulation of the responses to the questions related to the concepts list. The description of the transcribed additional comments was also included.

## Conclusions

As a method for collecting data, the survey technique employed served several purposes that might not have been achieved by any other method. As can be seen with the report of the findings in Chapter IV, a more comprehensive view of the concerns related to the topic has given the researcher a broader information base on which to make implications and recommendations. This was facilitated through the development of a study that involved an interview with the teachers being surveyed. Such interactions provide the valuable feature of obtaining qualifying statements to opinions.

Conclusions that can be drawn related to the first scale of the survey instrument are:

1. That 87% of the responses given by the teachers indicate that the Roth list of environmental education concepts were viewed as acceptable to the programs of multiple activity industrial arts instruction.
2. That 67% of the responses indicated that the Roth list of environmental education concepts were viewed as desireable for the programs of multiple activity industrial arts education.
3. That 39% of the responses indicated the concepts were viewed as highly acceptable to the programs of multiple activity industrial arts education.

4. That 18% of the responses indicated that the environmental education concepts were viewed as essential to programs of multiple activity industrial arts.
5. That 14% of the responses indicate that the concepts were viewed as unacceptable to multiple activity industrial arts education.

Conclusions that can be drawn related to the second scale on the survey instrument are:

1. That 1% of all the responses given indicated that environmental education concepts similar to those used in the study were used to initiate instruction in the I.A. programs the respondents taught.
2. That 12% of all the responses given indicated that environmental education concepts similar to those used in the study were frequently mentioned in I.A. programs taught by the sample.
3. That 35% of all the responses given indicated that environmental education concepts similar to those used in the study were sometimes mentioned in the I.A. programs taught by the sample.
4. That 65% of all the responses given indicated that the environmental education concepts similar to those used in the study were rarely mentioned in the I.A. programs taught by the sample.

5. That 35% of all the responses given indicated that the environmental education concepts similar to those used in the study were never mentioned in industrial arts.

Conclusions that can be drawn related to the third survey scale are:

1. That 53% of all the responses indicated that teachers felt that the availability of software was a factor that affected the introduction of the environmental concepts to their program of multiple activity industrial arts.
2. That 26% of the responses indicated indecision on a response to the third scale.
3. That 21% of all the responses indicated that teachers felt that the availability of software was not a factor that affected the introduction of the environmental concepts to their program of multiple activity industrial arts education.

A conclusion that can be drawn from this study is that the majority of teachers agree in principle that environmental education content is needed in industrial arts education in their programs. The teachers agree that multiple activity industrial arts by the nature of its definition gives teachers much latitude in incorporating environmental education concepts.

A further conclusion drawn from the study is that although the industrial arts programs appear to be flexible in definition, they have not to any great extent included much environmental education content.

Based on the findings described in Chapter IV, the researcher concludes that the availability of information appears to be of concern to teachers as a factor that may affect the inclusion of environmental education content in I.A. However, added concerns described in the research may in the estimation of teachers have a greater effect on the degree to which an environmental education concept is being included.

An observation made by the researcher during the course of the study was that because of the interest on the topic being researched and the method chosen to gather data from teachers, the researcher was well received by the majority of teachers the study was designed to involve. It is therefore recommended that more research that involves interviews with teachers be conducted.

An implication that can be drawn from the survey is that because of the highly consistent nature of the comments made by teachers during the survey, it appears that the involvement of larger numbers of teachers in the survey would not have substan ially changed the findings.

Recommendations

Based on the information the researcher has uncovered from the onset of this study the following is recommended:

1. The major recommendation that closer ties be established within the province between all the sectors that function in a research, advisory, policy making and especially teaching capacity with relation to

industrial arts education. The prime function of such ties in relation to this study would be to commence dialogue to plan a strategy for research leading to the eventual implementation of environmental education content in industrial arts programs.

Research Recommendations

Research areas this study recommends consideration be given to are the following:

1. Research is needed into the establishment of program goals that could be useful in achieving environmental education objectives within industrial arts education programs in Alberta.
2. Further research into the development of a conceptual model for the interface of environmental education content to industrial arts education is needed at all levels of industrial arts education in Alberta.
3. Further research is needed on the topic of those constraining factors that were cited as inhibiting the development of industrial arts activities that interface environmental education content.
4. Research is recommended to designate and develop tasks within all of the educational domains of learning that would be useful in achieving educa-

tional goals for industrial arts programs that interface environmental education goals.

5. Added research to identify administrative, physical and pedagogic components that are factors in the learning of environmental ethic and content in relation to industrial arts.
6. The literature review indicated that inter-disciplinary type of instructional designs appear to be the most flexible for introducing environmental education content. It is therefore recommedded that further studies be developed to research this type of curriculum design in relation to industrial arts education.
7. Further studies are needed to determine the place environmental education content has in relationship to the other curricular priorities of industrial arts teachers.

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# APPENDIX A

## Correspondence with R.E. Roth

This appendix includes a copy of a letter requesting permission to use the Environmental Management Education Concept List K-12 and a copy of the letter granting permission.

September 13, 1974

Dear Dr. Roth,

As a graduate student at the University of Alberta Industrial and Vocational Education Department I am required to complete a thesis to meet the requirements of my program.

The research topic that has been chosen to meet the requirement of a thesis has been "environmental concepts that have application to a multiple-activity industrial arts program as viewed by Alberta industrial arts teachers".

Reviewing the current literature on the topic has led to the discovery that you have made substantial contributions to the knowledge in a closely related area.

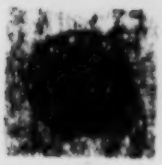
I therefore request your permission to use the concepts you have identified in "Fundamental Concepts for Environmental Management Education (K-16)". The concepts would be used in the development of an instrument for my study.

I shall certainly give proper credit for the concepts that are used in the study.

A quick reply to my request would be most appreciated. Thank you most sincerely.

George J. Hache

Graduate Student



THE OHIO STATE UNIVERSITY

October 3, 1974

Mr. George J. Hache
The University of Alberta
Department of Vocational and
Industrial Education
Edmonton, Alberta
CANADA

Dear Mr. Hache:

I am pleased to grant permission to use the concepts for Environmental Management Education found in Technical Report 126 of Research for Cognitive Learning. If you prefer, the same list is available in the dissertation and can be obtained from the University of Michigan, microfilms, Ann Arbor, Michigan.

My only request is that you provide me with copy of all materials produced in relationship to the list. Good luck in your pursuits!

Cordially yours,

Robert E. Roth, Chairman
Division of Environmental Education

RER:yi

Division of Environmental Education / 124 West 17th Avenue / Columbus, Ohio 43210 / Phone (614) 422-5589

# APPENDIX B

## The Survey Scales

This appendix includes a copy of the scales used to gather data on the List of Environmental Management Education Concepts.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

How acceptable is the concept to the program of multiple-activity industrial arts education in the province of Alberta?

_____ Essential
_____ Highly Acceptable
_____ Desireable
_____ Acceptable
_____ Unacceptable

To what degree is the concept or a variation of the concept currently being used in your program of I.A.?

_____ The concept is used to initiate learning activities in I.A.
_____ The concept is frequently used or mentioned.
_____ The concept is sometimes mentioned.
_____ The concept is rarely mentioned.
_____ The concept is never used or mentioned.

If soft-ware were made available to clarify methods of using the concept, would your rating of the second scale change?

_____ Yes
_____ Undecided
_____ No

# APPENDIX C

## Request to Conduct the Survey in Schools

This appendix includes a copy of the letter requesting permission to conduct the survey in the schools and a copy of the return form that was enclosed.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

February 12, 1975

Dear Mr.

This letter is a request for permission to interview selected teachers in your school system.

As an industrial arts teacher completing the requirements for a masters degree, I am writing a thesis that intends to identify useful environmental education concepts for industrial arts education programs. The thesis involves a thirty minute interview of industrial arts teachers that have been identified through a random selection process.

The teachers that have been chosen in your school system are as follows:

Each teacher will be asked for opinions on a prepared list of environmental education concepts.

Should you approve this request, I am confident that the interviews will prove beneficial for both the research and the teacher in your school. Tabulated results will be made available to all participants.

I would appreciate a response to this request as soon as possible. A response form has been enclosed for your convenience.

Thank you for considering my request.

Sincerely yours,

George J. Hache
Graduate Student

# Calgary Board of Education

Education Centre Building, 515 Macleod Trail S.E.
Calgary, Alberta T2G 2L9, Telephone: 267-9910 (Area Code 403)

Office of the Chief Superintendent

February 14, 1975

Mr. George J. Hache
Faculty of Education
University of Alberta
Edmonton, Alberta
T6G OY1

Dear Sir

This will acknowledge receipt of your letter of February 11, in which you request permission to interview selected teachers in our school system.

You have our permission to interview Mr. D. Comb, Sir John A. MacDonald Junior High, Mr. R. M. Stone, David Thompson Junior High School and Mr. D. Sugiyama, A. E. Cross Junior High School. It must be clearly understood, however, that these teachers have agreed to the interview on a voluntary basis and not on any direction from this office.

Mr. Welch, Cochrane Junior High School, does not come under our jurisdiction and hence we cannot give permission for his interview. You should contact the Calgary School Division No.41, 215 - 16 Avenue N.E., Calgary.

Yours sincerely

CHIEF SUPERINTENDENT OF SCHOOLS

/hw

EDMONTON PUBLIC SCHOOLS
10010 - 107A Avenue, Edmonton, Alberta T5H 0Z8, Telephone (403) 429-5621

March 12, 1975

Mr. W. A. Kiffiak
Administrative Assistant
Division of Field Experiences
University of Alberta
EDMONTON, Alberta

Dear Mr. Kiffiak

Re: RESEARCH REQUEST - George J. Hache

The above project has been approved on a permissive basis following examination by our Department and consultation with Mr. Jack Moffatt, Supervisor Vocational Education. The principals of four schools have tentatively agreed to have the project undertaken in their schools.

The requestor should now contact the following principals in the following schools to obtain final approval and to make the arrangements necessary for conducting the project:

C. Climenhaga, Principal, Allendale Elementary & Junior High (434-6756)
G. Tobert, Principal, D. S. MacKenzie Elementary & Junior High (434-5472)
W. Day, Principal King Edward Elementary & Junior High (439-2491)
D. Marion, Principal, Parkview Elementary & Junior High (488-1495).

I would appreciate receiving a copy of the results of the study as soon as they are available.

Sincerely

Tom Blowers, Ph.D.
Director of Research
Research & Evaluation

TAB/ks
c.c. Dr. D. R. Young
George J. Hache
Above Principals

x My permission is granted to interview industrial arts teachers

_____ My permission is not granted to interview industrial arts teachers

_____ I would like to receive the results of the study

_____ I would like a copy of the concepts list

NAME Dr. J.A. Earle, Acting Superintendent

School Division Or County _____

Calgary R.C. Separate School District No. 1

# APPENDIX D

## Cooperative Activities Forms

This appendix includes copies of the Cooperative Activities Program Forms used during the administration of the survey.

# COOPERATIVE ACTIVITIES PROGRAM

1. **Nature of Activity (Check One)**

   Student Teaching Internship _____ Demonstration/Experimentation _____

   Special Practicum _____ Research X

2. **Organization to be Involved**

   Edmonton Public School System _____ County of Strathcona _____

   Edmonton Separate School System X St. Albert Protestant/Separate

   N.A.I.T. _____ School System _____

   U. of A. Faculty of _____ Other _____

3. **Requestor (staff member)**

   **Name** Dr. D. R. Young **Position** Associate Professor **Date** Feb. 18/75

   **Request made on behalf of** George J. Haché

4. **Description of Activity - Include title, objectives, procedure, evaluation, techniques, etc.**

   Title: Environmental Education Concepts for Industrial Arts Education Programs.

   Objective: 1) To develop a list of Environmental Education Concepts that could be used in I.A. programs.

   2) To get teachers reactions toward the usefulness of a list of concepts to the multiple activity programs of Industrial Arts in the province.

   Procedure: By means of a literature review, the field of education, environmental education, and industrial arts was researched for useable list of concepts that could be used to initiate instruction in industrial arts programs.

   The list of 111 concepts derived from the review was selected as a battery of representative concepts for the study. The list will be submitted to teachers in the schools. Teachers will be asked for information in regard to the useability of the concepts in multiple activity programs.

   Each teacher will be interviewed (30 - 45 min.). The procedure for the interview requires that the teacher convey an opinion for each concept described by the interviewer. Responses will be taped and handled as confidential information.

5. **Anticipated value to requestor**

The requester serves as a thesis supervisor.
The information will be used as part of a Masters' thesis in Education at the University of Alberta.

6. **Anticipated value to cooperating organization**

The results of the study may provide a battery of useful concepts teachers could use to initiate instruction in programs of industrial arts.

7. **Estimate of cost** (see renumeration guidelines)

None.

8. **Suggested personnel, schools and times**

| SCHOOLS: | TEACHERS: |
|---|---|
| H. E. Beriault | G. Starko |
| Holy Cross | R. Aloisio, L. Dumesnil |
| St. Alphonsus | J.M. Holman |
| Archbishop O'Leary | M. Hycum |

**For Office Use Only**

**Approved by** Ed Kipfer **Division of Field Experiences** **Date** Feb. 19/75

**Approved by** Anne Sure E&SD **Date** Mar 4/75

**Subject to the following conditions:**

(a) **A report of the results of findings of this project is required by the cooperating school system (Check One)** **yes** ☐ **no** ☐

(b) **Other** Please contact the following Principals to make arrangements for your visit:

Miss E. M. Meyer, Archbishop O'Leary, 8760 - 132 Avenue, Phone 476-6251

Mr. N. P. Gour, Holy Cross, 15120 - 104 Avenue, Phone 489-1981

Mr. G. R. Dunnigan, St. Alphonsus, 11624 - 81 Street, Phone 477-2513

# COOPERATIVE ACTIVITIES PROGRAM

1. **Nature of Activity** (Check One)

   Student Teaching Internship _____ Demonstration/Experimentation _____

   Special Practicum _____ Research X

2. **Organization to be Involved**

   Edmonton Public School System X County of Strathcona _____

   Edmonton Separate School System _____ St. Albert Protestant/Separate

   N.A.I.T. _____ School System _____

   U. of A. Faculty of _____ Other _____

3. **Requestor** (staff member)

   **Name** Dr. D. R. Young **Position** Associate Professor **Date** Feb. 18/75

   **Request made on behalf of** George J. Haché

4. **Description of Activity** - Include title, objectives, procedure, evaluation, techniques, etc.

   Title: Environmental Education Concepts for Industrial Arts Education Programs.

   Objective: 1) To develop a list of Environmental Education Concepts that could be used in I.A. programs.

   2) To get teachers reactions toward the usefulness of a list of concepts to the multiple activity programs of Industrial Arts in the province.

   Procedure: By means of a literature review, the field of education, environmental education, and industrial arts was researched for useable list of concepts that could be used to initiate instruction in industrial arts programs.

   The list of 111 concepts derived from the review was selected as a battery of representative concepts for the study. The list will be submitted to teachers in the schools. Teachers will be asked for information in regard to the useability of the concepts in multiple activity programs.

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The requester serves as a thesis supervisor.
The information will be used as part of a Masters' thesis in Education at the University of Alberta.

6. **Anticipated value to cooperating organization**

The results of the study may provide a battery of useful concepts teachers could use to initiate instruction in programs of industrial arts.

7. **Estimate of cost (see renumeration guidelines)**

None.

8. **Suggested personnel, schools and times**

| SCHOOLS: | TEACHERS: |
|---|---|
| D. S. MacKenzie | A. Caldwell, E. Rudyk |
| Allendale | W. Ellis |
| Parkview | G. Porter |
| King Edward | S. Pawluk, H. Pueschel |

---

**For Office Use Only**

**Approved by** A. Kozak **Division of Field Experiences** **Date** Feb. 19/75

**Approved by** T. Blowers **Date** Mar. 11/75

**Subject to the following conditions:**

(a) **A report of the results of findings of this project is required by the cooperating school system (Check One)** yes ☒ no ☐

(b) **Other**

# APPENDIX E

## Correspondence with Teachers

This appendix included a copy of the Concepts list and a letter that was mailed to each teacher in the survey.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

February, 1975

Dear Mr.

You may have already been notified by your school board or principal that a study is being conducted to determine the usefulness of a group of environmental education concepts to programs of industrial arts in the province of Alberta.

May I take this opportunity to say that I was pleased to see that you are on the list of teachers to be interviewed for opinions. I am enclosing a list of concepts that experts have decided are applicable to educational settings at the K-16 levels. You may find the time to read and reflect on the concepts before the interview. The task for the interview will be to record your reactions on three rating scales for each of the concepts.

Once again, thank you for your cooperation in this study. I shall be looking forward to our interview on the following date;

_____.

Sincerely yours,

George J. Hache

GH
Enclosure

ENVIRONMENTAL MANAGEMENT EDUCATION
CONCEPTS - A LIST

1. Living things are interdependent with one another and their environment.

Environmental Management

2. Man has been a factor affecting plant and animal succession and environmental processes.

3. The management of natural resources to meet the needs of successive generations demands long range planning.

4. Environmental management involves the application of knowledge from many different disciplines.

5. Modern man affects the structure of his environment.

6. Esthetic resources and recreational facilities of economic and noneconomic value are becoming increasingly important in leisure-time activities.

7. Man has ability to manipulate and change the environment.

8. A knowledge of social, physical, and biological sciences and humanities are important for environmental understanding.

9. Social and technological changes alter the interrelationships, importance, and uses for natural resources.

10. There are certain risks taken, and limitations experienced when manipulating the natural environment.

11. Resource depletion can be slowed by the development and adoption of alternatives.

12. Environmental management has effects on individuals and social institutions.

13. Man's need for food, fiber, and minerals increases as populations expand and levels

of consumption rise.

14. Conflicts emerge between private land use rights and maintenance of environmental quality for the general public.

15. A cultural and time lag exists between the development of knowledge to science and technology and application of that knowledge to resource and environmental problems.

16. Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

17. The management of natural resources is culture bound.

18. Increased population mobility is changing the nature of the demands u, on some resources.

19. Options available to future generations must not be foreclosed.

20. A variety of institutional structures is involved in planning and managing the environment.

21. Hunting regulations are useful in maintaining and restoring populations as well as in distributing the game harvest.

22. Multiple use is a practice in which a given land area functions in two or more compatible ways.

23. Management of habitat is considered to be an effective technique of wildlife management when the desire is to increase numbers of particular populations.

24. Architecture can be one of the positively persuasive influences in developing a congenial environment.

25. Zoning is a practice in which land uses are prescribed based upon value judgements regarding the needs of society.

Economics

26. Ready transportation, growing interest, money surpluses, and increased leisure time combine to create heavy pressures on existing recreation facilities and demands for new ones.

27. Outdoor recreation is an increasingly important part of our cultural resources and technologies over time.

28. The economy of a region depends on the utilization of its natural, human, and cultural resources and technologies over time.

29. Economic efficiency does not always result in conservation of natural resources.

30. The distribution or location of resources in relation to population, technological, and economic factors are critical to problems of resource conservation and use.

31. The political and economic strength of a country is, in part, dependent upon its access to domestic and foreign resources and international relationships.

32. Conservation policy is determined by the interaction of science and technology; social and political factors; and esthetic, ethical, and economic considerations.

33. Conventional benefit-cost analysis do not always result in sound conservation decisions.

34. A sound natural resource policy is dependent upon a flexible political system, pragmatically appraising and reappraising policies and programs in terms of their effect upon the public interest and in light of scientific knowledge about the natural resources.

35. Consumption practices are constantly being expanded by our ability to produce and create wants and markets, which affect the rate of resource use.

36. Individuals tend to select short-term economic gains, often at the expense of greater long-term environmental benefits.

37. Increasing population and per capita use of resources have brought changed land to man or resource to population ratios.

38. Goods and services are produced by the interaction of labor, capital, natural resources, and technology.

39. Long-range planning for the use and allocation of natural and human resources is continually evolving.

40. Choices between needs (essentials) and wants or desires (nonessentials) are often in conflict.

41. Raw materials and energy supplies are generally obtained from those resources and places where they are available at least cost, usually in short economic terms.

42. Supply and demand, in relation to values held by society, determine what is a resource and its economic values.

43. The more efficient use of some resources is the result of technical and marketing improvements.

## Environmental Problems

44. Safe waste disposal, including the destruction of harmful and cumulative effects of various solids, liquids, gases, radio-active wastes and heat, is important if the well-being of man and the environment is to be preserved.

45. Pollutants and contaminants are produced by natural and man-made processes.

46. Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promote increasing environmental contamination.

Environmental Ecology

47. Natural resources are interdependent and the use or misuse of one will affect others.

48. In any environment, one component like space, water, air, or food may become a limiting factor.

49. Most resources are vulnerable to depletion in quality, quantity, or both.

50. The interaction of environmental and biological factors determines the size and range of species and populations.

51. Natural resources, water and minerals in particular, are unequally distributed.

52. The renewable resource base can be extended by reproduction, growth, and management.

53. Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

54. The natural environment is irreplaceable.

55. An organism is the product of its heredity and environment.

56. Man is influenced by many of the same hereditary and environmental factors that affect other organisms and their populations.

57. The rate of change in an environment may exceed the rate of change in an organism.

58. Organisms and environments are in constant change.

59. All living things, including man, are continually evolving.

60. The form of life present depends upon the coincidence of the life needs and their availability in an environment.

61. Biological systems are described as dynamic because the materials and energy

involved are parts of continuous cycles; inorganic materials and energy become part of organic materials and are subsequently broken down into simpler substances and energy as a result of the operation of organic systems.

62. Animal populations are renewable resources.

63. Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition.

Natural Resources

64. Water supplies, both in quantity and quality, are important to all levels of living.

65. The earth and life on it are greatly affected by the atmosphere.

66. Water is a reusable and transient resource, but the available quantity may be reduced or quality impaired.

67. As populations increase competition for the use of water increases resulting in a need for establishing water use priorities.

68. The amount of precipitation that becomes available for use by man varies with topography, land use, and applied management practices.

Minerals

69. Mineral conservation involves the utilization of all known methods of using the minerals of the earth's crust that will cause them to serve more people for a longer time.

70. The nonrenewable resource base is considered finite.

71. Soil is classified as a renewable resource but, because it may take a few years to thousands of years to be "renewed", it is more practically termed a depletable resource.

72. Minerals are nonrewable resources.

(Soil)

73. Maintaining, improving, and in some cases restoring soil productivity is important to the welfare of people.

74. Geological process.s like erosion and depostion modify the landscape.

75. Soil productivity can be maintained by utilizing known agronomic, mechanical, and chemical processes.

(Plants)

76. Green plants are the ultimate source of food, clothing, shelter, and energy in most societies.

77. Plants are renewable resources.

78. Energy is supplied to an ecosystem by the activities of green plants.

(Animals)

79. Wildlife refuges, undistrubed natural areas, and preserves may be of value in protecting endangered species and perpetuating the gene pool.

80. Wildlife populations are important economically, esthetically, and biologically.

81. Wildlife is considered to be a public resource.

The Socio-Cultural Environment

82. Man has responsibility to develop an appreciation of and respect for the rights of others.

83. Individual citizens should be stimulated to become well informed about resource issues, problems, management procedures, and ecological principles.

84. Conservation responsibilities should be shared by individuals, businesses and industries, special interest groups, and

all levels of government and education.

85. Man has a moral responsibility for his environment decisions.

86. Knowledge of social structures, institutions, and culture of a society must be brought to bear on environmental considerations.

87. The relationships between man and the natural environment are mediated by his culture.

88. Man is developing the technical and sociological knowledge needed to control population growth, modify environment, and alter resource use patterns.

89. Social values and mores influence personal conservation behavior.

90. Public opinion constitutes a control over the use of conservation practices.

91. In a democracy, a basic theory is that increasing restrictions on resource allocation and use are imposed by the consent or insistence of the people.

Culture

92. The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

93. Man has psycobiological and biosocial needs.

94. Human resources include the physical and mental abilities with which man is endowed and the knowledge he has generated.

95. Historically, cultures with high technological development have used more natural resources than those with lower levels of technological development.

Politics

96. Individual citizens should be stimulated to become active in political process.

97. We have "legal" ownership of some resources like real estate and control over others during our lifetime, but ethically we are "stewards" rather than owners of the resource base.

98. Policies, including natural resource policies, came about as the result of interacting social processes: science and technology, government operations, private interests, and public attitudes.

99. Conservation policies are often the result of group action.

100. As populations increase and/or as resource supplies decrease, the freedom of the individual to use the resources as he wishes decreases irrespective of the form of government.

The Family

101. Family planning and the limiting of family size are important if over-population is to be avoided and a reasonable standard of living assured for successive generations.

102. An individual must develop his ability to perceive if he is to increase his awareness and develop environmental perspectives.

103. Individuals perceive different self-roles depending upon their position in the social and environmental context.

104. Man has the capability of improving society through sociology, psychology, and science.

105. Man is a high animal form because of his ability to reason.

106. Man is continually developing an ethical base for making value judgements.

107. Man performs some tasks at a high physiological cost.

Psychological Aspects

108. Opportunities to experience and enjoy nature are psychologically rewarding to

many and are important to mental health.

109. The need of man to turn inward for self-renewal can be stimulated by his external esthetic experiences.

110. Resources have a psychological impact on people.

111. Emotional reactions can be elicited by exposure to physical objects and geometric forms.

Roth, R.L. , Environmental Management Concepts--A List, Wisconsin University Madison Research and Development Center for Cognitive Learning, 1970.